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## The System That Wasn't

By E. Drake Lundell Jr.
Of the CW Staff

NEWTON, Mass. – Users got a glimpse at what may be Itel's next entry into the IBM-compatible CPU field through an ad the firm placed in *Computerworld* last week.

But the ad ran by mistake, Dick Grove, Itel's advertising manager, said, "and not through any fault of *Computerworld*."

Now the firm won't confirm anything that was in the ad, according to Richard H. Lussier, president of Itel's Data Products Group.

"The product we will announce, when we are ready, may be that or it may be dramatically different from that. The ad was one of several we were considering that vary in appearance and content, and it shows just one possible variation of what we may announce," Lussier said.

The ad ran as a result of a "communications problem" in the media department of the advertising agency that handles the Itel account, he added.

The firm had recently announced it plans to offer additional IBM-compatible CPUs and these CPUs will be built for Itel by Japan's Hitachi. However, Itel refused at that time to give any details of the proposed offerings [CW, July 18].

The inadvertent ad described a system called the Advanced System/6 (AS/6), said to be equivalent to the IBM 370/168-3 but priced $1 million less. It was also said to be three or four times more powerful than the Itel AS/5.

In addition, the system was said to take half the floor space of the 168 and to be air-cooled so it did not need the "intricate" water-cooling systems required by the IBM CPUs.

Although Itel said last week it would announce its plans for additions to the AS family in "the near future," apparently this may not be one of the offerings, since the firm has disavowed the ad.

What many observers expect is that Itel will wait until IBM announces its long-expected 3032 CPU, which would be an upgrade to the 370/158 in the same way

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## Carter Revamp Plan Eyed As Threat to OTP Visibility

By Edith Holmes
Of the CW Staff

WASHINGTON, D.C. – President Carter's reorganization plan that would move the Office of Telecommunications Policy (OTP) out of its place of prominence in the White House and into the Department of Commerce has met with skepticism on Capitol Hill.

Sent to the Congress just over a week ago, the President's "Reorganization Plan No. 1 of 1977" would discontinue OTP as part of the executive office of the President. The plan would retain a small telecommunications staff – as part of what would be called the Domestic Policy Staff – to brief Carter on any significant national communications and information questions that arise.

The chairmen of the Senate and House Subcommittees on Communications are concerned that national information policy issues – such as electronic mail, electronic fund transfers and a revision of the communications laws – could lose their visibility under the Presidential plan, which would create an Assistant Secretary for Communications and Information within the Commerce Department.

Accordingly, Sen. Ernest Hollings (D-S.C.) and Rep. Lionel Van Deerlin (D-Calif.) may offer legislation that would establish a full-blown agency or administration devoted to telecommunications and information policy if they aren't satisfied within the next month that OTP's present status won't be downgraded by the move, a spokeswoman for the Senate subcommittee said.

The staff remaining in the White House structure would number less than six, according to a spokesman with the President's Reorganization Office.

The Office of Management and Budget (OMB) would receive all the OTP functions relating to the management of government communications and the arbitration of interagency disputes regarding frequency allocation, he said.

OMB would also be in charge of establishing telecommunications procurement policy for the federal agencies, the spokesman noted, suggesting the General Services Administration (GSA) would play a lesser role in this area.

"All other functions except developing Presidential policy options would be transferred to a new office within the Department of Commerce, headed by a

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### Not a Real Catastrophe

## N.Y. Users Find Blackout Only a Nuisance

CW Staff Round-Up

New York's DP centers appear to have come through the recent blackout virtually unscathed.

Computer technology has apparently progressed to the point where even a major power failure is more of a nuisance than a catastrophe. In fact, many users expressed surprise at the ease and speed with which they were able to bring their systems back up after power was restored.

The major problem in most centers hit by the blackout [CW, July 18] seemed to be the backlog of work that resulted in people working extra shifts.

An IBM spokesman said his firm experienced a definite increase in service calls through the weekend after the blackout, but he could not estimate a percentage increase directly attributable to the blackout.

"Our customers were overall understanding of the situation and customer reaction was good," he said, noting that the lack of disaster stories is perhaps a result of the fact that users are well prepared for any eventuality.

A random survey of large systems users in New York revealed a surprisingly low level of frustration and a noticeable level of satisfaction with DP's ability to survive acts of God or man.

In some cases, uninterruptible power supply (UPS) systems were credited with saving a center.

The data center at Merrill Lynch, Pierce, Fenner & Smith, Inc., for example, experienced "no delay in processing" during the blackout thanks to the firm's UPS, according to Ted Vande Woude, vice-president of computer services.

"Merrill Lynch ran the whole time," he added, and even took on some work of those shops that were affected by the disaster. The brokerage house, which has three IBM 370/168s and one IBM 370/155 at its main data center, ran for "27 hours with turbines charging the batteries."

The shop has been "well-prepared for this for the last five years," Vande Woude noted, adding the regular Consolidated Edison power supply is "very poor."

"So many data centers spend a lot of time every year trying to justify spending money on a UPS system," he said, but "one incident like this pays for the expense of preparing a shop" for this kind of disaster.

### Hero of the Day

In most cases, however, the hero of the day was the "power off" button that prevented damage to CPUs and disk and tape drives once the power surged back on.

The Bowne Time Sharing network headquartered in New York was out of operation for 24 hours. Minutes before power was lost, operators in the DP center noticed the lights beginning to dim and promptly pushed the stop button on the firm's dual 370/155.

Shortly thereafter, all power to the center was lost, according to vice-president Dave Herr. When power was restored about 9:30 p.m. the next evening, every piece of equipment came back on without damage. This included IBM 3330-type disks and 1270 communications front ends from Memorex Corp.

"Our only residual problem was with New York Telephone," Herr reported, because it needed power to run the pumps that keep water out of its cables. The pumps used to keep phone cables dry

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## No Business For Fraud Squad

By Catherine Arnst
Of the CW Staff

TALLAHASSEE, Fla. – A special police unit organized here a year ago to train police in DP crime detection has yet to train anyone because of a lack of interest from the business community.

"Computer crime is something the business community would rather not address unless something really happens," according to Robert Martindell, a special agent with the Florida Department of Criminal Law Enforcement's Strategic Investigators Unit.

The computer crime unit is part of a white-collar division of the Department of Criminal Law Enforcement, which has statewide police powers. Martindell, who was in DP for 12 years before turning to law enforcement is the only agent with any experience in the computer field. There are five agents in the white-collar crime division.

The program was set up in August 1976, but no guidelines have been established because there are no particular cases on which to base them, Martindell said. "No one is reporting any cases due to lack of interest," he added.

Martindell has given three speeches

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## Users Plan to Battle Bell Bill, Fear End to Freedom of Choice

By Ronald A. Frank
Of the CW Staff

SAN FRANCISCO – Members of one of the nation's largest telecommunications user groups have voted to oppose the AT&T-fostered Consumer Communications Reform Act on grounds that it would reduce competition and limit users' freedom of choice.

The Tele-Communications Association (TCA) recently voted and put into resolution form its decision to "oppose enactment of the Consumer Communications Reform Act of 1977 in the versions submitted to date."

The TCA position was also included in a resolution that affirmed the "policy of continued competition in the private-line and telephone terminal equipment" areas. It stated further that "competition has encouraged innovation . . . and has resulted in new product offerings by all suppliers."

The TCA resolution and a supporting position paper were approved recently by a two-thirds majority of members voting on the issue. Robert Barnwell, president of TCA and corporate manager of office services at Fibre Board Corp., said he could not divulge the number of members who participated in the vote on the resolution.

TCA currently has 330 member companies with about 674 individual memberships, he said.

The TCA stand on a major national issue such as the Reform Act is considered especially significant by industry observers because most user organizations in the telecommunications area specifically forbid public statements as part of their

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# Blackout a Nuisance, Not a Catastrophe

*(Continued from Page 1)*

were not operating and, as a result, cables running to the DP center were out of service until the following Monday.

Nothing was powered down when the failure came, so everything "went down hard," but there was no permanent damage to the hardware. The CPUs were stopped but still powered up after the crisis was over.

Asked about installing backup systems now, Herr said it would be very difficult. "From what we've seen, we'd have to power the entire building" to stay in operation, he said.

### No Warning

At Gimbel Brothers, Inc., DP employees on-site at the time of the blackout calmly inactivated their 370/145 and manually rewound the tapes which had stopped in mid-processing, according to Mike Stearne, group financial manager of computer services for the department stores.

Stearne and two other 370/145 users affected by the unsuccessful manual attempts to rectify the problem had no warning from their systems that the power had even fluctuated a total of 8% between 9 and 9:20 p.m. or would go off at 9:34.

IBM 370/145s have an electrical component called a "motor generator" that smooths the flow of electrical power to the CPU to combat power disturbances and fluctuations, according to Stearne.

That equipment, built into the mainframe to prevent data loss or error, allows an easy transition from a voltage drop even as great as that suffered by New Yorkers before the actual blackout, Stearne explained.

Although the two second-shift employees in the DP department at the City of New York Municipal Services also had no warning from their system, they turned off the power to it when lights began flickering and dimming during the first voltage reduction.

Two employees at Data Dimensions, Inc. followed the attack plan taken by Gimbel's DPers by shutting the system down seconds after the lights went out altogether, Frank Crocitto, facilities manager, told *Computerworld*.

### No Plans for UPS

None of these three users had a UPS before the blackout and none plan to get one as a result of it because, as they see it, it is unnecessary considering the small number of blackouts.

As for what the blackout "cost," the Data Dimensions spokesman noted his people who were on standby with flashlights in the computer room were bored, hot and generally uncomfortable.

After the blackout, one of these users called IBM to bring its 370/145 back up because he said he had to do so. Another opted to have IBM service engineers power-up the system and the third did it himself.

Gimbel's, Data Dimensions and the Municipal Services office all work their systems 24 hours a day so, as one user said, all that could be done after the power returned was to run the jobs faster or do critical jobs first.

Unlike many shops that returned to normal operations last Monday, Gimbel's Stearne said his shop was back on schedule by last Thursday.

Even with a staff increase, there is very little a 24-hour shop can do to get back on schedule except "pray a lot," he added.

None of the users reported any equipment damage from the blackout or related problems.

At Lever Brothers Co., flickering lights were the first indication that anything was wrong "and then everything just blitzed out," according to P. Healy, DP manager.

The DP center had no backup system, but operators were able to hit the stop button on the 370/155 and power down, so there was no damage to either equipment or data, Healy said.

Even though the system was down for 24 hours, there were no problems powering up as soon as electricity was restored, he said, but noted the center did have to wait for about an hour after that – until the air conditioners cooled the room to an acceptable temperature – to begin operating.

### Tremendous Backlog

The Federal Reserve Bank was without computer resources from about 9:30 Wednesday evening until 10:45 Thursday night, according to a spokesman. But no records were lost, no equipment was damaged and "bit by bit things are being put back into order," he said.

Once the computer, an IBM 370/155, was up again, however, there was a tremendous backlog of work which resulted in many departments working over the weekend to catch up.

"All statistics we issue weekly are out, but we were still making some changes and revisions" as of last Wednesday, he noted.

He admitted, however, that some releases usually issued on Thursday did not get out until last Monday.

Interestingly, the Federal Reserve has a backup system for its offices, but not for the computer center. As a result, employees had lights and air conditioning for work on Thursday but no computer.

The bank's only real problem was the loss of its link with the national Federal Reserve communications switch in Culpepper, Va., and that was restored by Friday morning, he said.

*This story was prepared by Toni Wiseman, John P. Hebert, Ronald A. Frank and Esther Surden.*

# Itel Ad: The CPU That Wasn't

*(Continued from Page 1)*

the 3033 is an upgrade to the 370/168.

Then, the reasoning goes, Itel will announce the AS/6 as a replacement for that newer system rather than for the older 168-3, as was envisioned in the advertisement.

By doing this, Itel will be placing the AS/6 in the marketplace as a competitor for a brand new IBM CPU which would be regarded as having a longer life than the older unit. It will also put Itel in the running with a compatible replacement immediately after IBM announces its product in the area, rather than several months or years later.

Originally, Itel had probably wanted to announce the AS/6 sometime in the week preceeding the July 18 issue of *Computerworld* and wanted the ad to appear immediately after the announcement, when the product would have received maximum press coverage, observers said.

The deadline for submitting a four-color ad in that issue would have been July 1 because of the way such ads are printed.

The ad was submitted to the *Computerworld* advertising department with an insertion order calling for it to appear July 18.

What happened next is a matter of conjecture, but apparently the firm decided to put off the announcement date. However, neither it nor its advertising agency informed *Computerworld* the ad was to be cancelled. Therefore, it appeared right on schedule, as called for in the contract.

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## Recalls Flashing Lights

# DEC's Olsen Traces Mini Roots at MIT

CW Photo by A. Dooley

Kenneth H. Olsen

By Ann Dooley

Of the CW Staff

CAMBRIDGE, Mass. – The Whirlwind computer, the first of its kind, had all the features of a minicomputer "except that it was big," Kenneth H. Olsen, Digital Equipment Corp. president, told a group of MIT alumni here recently.

The Whirlwind was really very much like the mini, he said. Although it still used vacuum tubes, it had high-speed capability, was simple and ran in real time.

It was designed at MIT during the early '50s, when researchers everywhere were "feeling their way" because the technology was so new, Olsen said.

During those first years, people thought computers had to be built "taller than a man" in order to be impressive, Olsen recalled, adding the computer room was often kept dark with lots of flashing blue lights.

MIT had an advantage over other schools because it didn't allow professors to do the research, according to Olsen, so "we didn't have to make everything elegant."

Olsen and the others who left MIT to form DEC took a lot of valuable experience with them, he said.

When Digital was started, Olsen was told to tell the company's investors three things. First, he was to promise fast results "since most of the investors were over 80," he said.

Next, he was to assure a 10% profit. Finally, he was to avoid using the word "computer" in the company name since "computers were not making any profit and weren't expected to," Olsen said.

### Growth Since '50s

Since the Whirlwind was designed in the early '50s, improvements have been negligible in some ways and dramatic in others, Olsen pointed out.

There has been an enormous growth in the types of computer applications, but "we are probably still naive about their use," he said.

Some of the more observable changes in computers are their reduction in size, the increased use of memory, decreases in memory cost and the reduced size and increased amount that can be put on a chip, Olsen said.

The cost of minis has steadily decreased, enabling them to be used where they've never been used before, he said. The mainframe dollar has gone down, but users are demanding more and more memory.

As a result, computers have stayed at essentially the same price, he noted.

Mainframes will always have their place and will never be taken over by minis, which will remain as an aid.

The most recent change in the computer industry is the rise of the hobby computer market, which will have great social significance, Olsen claimed. Soon, large numbers of people, especially the young, will learn about computers, he added.

There might be some overselling and "some disappointed parents because it doesn't make their kid a genius," Olsen said, but it will be a natural growth for the most part.

When change comes through natural evolution, no one notices it or gets upset about it, and that's what has happened with computers so far, he said.

As long as the industry can be "kept free of government control" it should continue on its positive course. Right now the U.S. dominates the world computer market, but if the "government gets its hands on it, that might change," he said.

For instance, if the government were to regulate standards, there would be few new developments, he said, because everyone would be afraid to experiment.

# IBM Votes to Rebuy Big Blocks of Shares

ARMONK, N.Y. – IBM's board of directors has authorized another stock-repurchase, this time of up to $700 million of its shares, at the current market price.

Last February IBM issued a tender offer to its shareholders, offering to purchase up to 5.5 million shares at $280 each. It eventually purchased some 3.5 million shares at an estimated cost of $721 million.

Rather than making a tender offer, IBM currently is simply letting it be known that it would consider buying large blocks of stock from time to time, according to an IBM spokesman. The offer is aimed primarily at institutional investors since IBM is only seeking blocks of "5,000 shares or more."

In addition, IBM said it will buy only through direct transactions with "principals who aren't brokers or dealers" and who offer the stock at no more than the market price at the time of the sale.

"We continue to believe IBM stock is a good investment for a portion of our funds," the spokesman said. "Prior to our tender offer for IBM stock earlier this year, we occasionally had offers to sell substantial blocks of IBM stock [to IBM], but we didn't pursue them.

"The decision to consider purchasing these blocks is consistent with our intentions during the tender offer," he said.

"The possibility of an overhang was certainly a factor" in the latest decision to accept offers of blocks of stock, he noted.

The $700 million offer, which translates into about 2.5 million shares at current prices, is a ceiling, not an objective, he added.

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## Unlike Trade Secrets, Contu Told

# Economists Say Software Copyrights Better for Users

By Edith Holmes
Of the CW Staff

WASHINGTON, D.C. – Of the two principal methods now available to protect computer programs – copyrights and trade secrets – the copyright gives users better market information on packages they might buy.

This was one of the findings of a team of economists hired by the National Commission on New Technological Uses of Copyrighted Works (Contu) to study protection alternatives.

At a meeting here recently, William J. Baumol, a professor of economics at both New York University and Princeton, told Contu members that copyright protection reduces duplication of effort in the software industry and tends to lead to the availability of a wider variety of products – again, pluses for the user.

"Copyright promotes disclosure. Reliance on the trade secret statutes requires suppression of information on advances in software design," according to the economists' report, entitled "Economics of Property Rights as Applied to Computer Software and Data Bases."

If software suppliers have to rely on trade secret laws, they will have an incentive to keep their programs and data bases secret to prevent unauthorized use, the report added. Furthermore, programs will tend to be written in obscure form, adding to the problems of modifying software or transferring it to another manufacturer's CPU.

Copyright protection, on the other hand, encourages the development of software that can be used for many purposes and on many different mainframes since it gives a producer of programs a wider market without fear of unauthorized use of his products.

### Duplication of Effort

Not only will potential buyers of software lack information on what is available to them if programs are protected by trade secret law, but competition among suppliers also will lead to a duplication of efforts, the report said.

"Too many resources will be devoted to the development of software which is similar to existing products – too few resources will be devoted to highly innovative and more risky software developments, which are beneficial to society, but less profitable to an individual firm," the study continued.

Presenting the preliminary results of the National Bureau of Standards (NBS) "Study of Copyright in Computer-Readable Works," Roy G. Saltman, the project's director, agreed.

"This study finds that without copyright protection for computer programs, losses in information flow, increased procedures for secrecy and less opportunity for creativity would result," he told Contu.

### Debate Over Time

While Contu's members heard a clear preference for copyright over other forms of software protection from those the commission hired to look into the problem and from NBS, which is conducting an independent study of the matter, they also witnessed some disagreement over the means of providing copyright protection.

From Saltman's viewpoint, the author of a computer program should not be treated differently from the author of any other type of copyrightable work. So, he concluded, copyrights should last as long for computer programs as they do for any other work falling under their protection.

But Baumol and his colleagues believe there are one or more "optimal time spans" for the protection of software. The optimal time span provides a compromise between two effects, the economist said.

"On the one hand, the longer the period of protection, the more profitable is the development of new software and the more will be produced.

"But the temporary monopoly during which a producer can charge a price for the use of his products also discourages some potential users, and in this way reduces the social usefulness of whatever amount of software is produced," Baumol stated.

The report he presented to Contu identified four economic and technological factors which tend to favor a short protection period. They include the short useful life span of software packages; rapidly increasing costs with an increase in the production of software; a user demand for programs that are very responsive to price changes; and a high discount rate.

The economists developed formulas by which the optimal protection period for software could be calculated using industry data, but Baumol noted the actual choice of a protection period will require further research in gathering the necessary data.

He further asked the commissioners not to rule out the possibility of recommending several protection periods.

There is a social cost to extending protection beyond the point at which it is really needed, Baumol said. A protection period of two or three years is reasonable for software which has an average useful life of about four years, he said, but one NBS recommendation takes a better approach and would make this distinction between software and other copyrightable works unnecessary.

That recommendation urges that an original copyright be obtained only for the source program and not the object code. This would encourage a separation of the programmer's expression from the changing hardware technology, Saltman explained.

"Furthermore, even if popular source languages are altered or improved, or if new source languages arise, the copyright proprietor retains the right to modify his work or prepare derivative works, permitting him to update the program as required," Saltman concluded. "The writing of programs in source languages that can be expected to endure is promoted."

One argument often cited against copyrighting computer programs is that the software industry is so strong that protection is unnecessary.

However, the NBS preliminary study pointed out that copyrighting is not aimed at protecting an industry, but rather at protecting a particular work in the marketplace.

This government agency has concluded that copyright protection is particularly important for the smaller company that does not have the resources to engage in retaliatory measures or to protect itself from predatory practices of larger firms when its software is endangered.

On the subject of computerized data bases, the NBS contended that while it is "not immediately clear . . . whether the initial deposit [of data bases with the Copyright Office] should be a printout or a magnetic tape or disk . . . It seems reasonable to suggest that it should be the complete data base, not just identifying descriptions."

In the case of a data base that is continuously updated, the deposit of the complete data base could be required at least once in a period of several years – for example, every 10 years, Saltman stated.

# Baumol Sees Software Growth Stimulating Economic Growth

WASHINGTON, D.C. – Encouraging software design, whether through copyright protection or by other means, is an important element in stimulating economic growth, William J. Baumol, professor of economics at both New York University and Princeton, said here recently.

Addressing the National Commission on New Technological Uses of Copyrighted Works (Contu), Baumol added that "declining costs of computer hardware and expanding opportunities for automation imply that computer hardware and software together will play an increasingly crucial role in our economic future."

Just how crucial a role does the economist foresee for computer technology?

Baumol cited a study he and several other economists made on the costs of library operations and publications some years ago." These costs turned out to be remarkably different from costs in the economy as a whole," he said.

While the level of general inflation was 1.5% at that time, the rate of inflation facing libraries and publications was between 6% and 7% and compounding annually.

Because labor is an essential part of the product traditional information institutions produce, their costs will continue to go up, Baumol said. As a result, he noted, there are increasing economic pressures for finding substitutes for the traditional means of disseminating knowledge.

Electronics costs have gone in the opposite direction of those of libraries and publications, Baumol stated, and there is "no reason to suspect the end of that trend is in sight."

Before long "we will have electronic substitutes for the information that has been stored in library stocks and contained in printed matter," Baumol maintained. "We may not like these substitutes, but economics will press us toward them."

The devices to replace or take over many library and publication functions already exist. However, they are little used because people are unfamiliar with them and, for the moment, they are more costly than traditional information approaches, Baumol said. In two decades, however, "what is science fiction today will be reality."

# Three Counterclaims Dismissed In Brewer's Case Against EDS

NEW YORK – The case of F&M Schaefer Brewing Co. vs. Electronic Data Systems Corp. (EDS) has proceeded one step further with the dismissal of three counts of fraud brought by EDS against the beermaker.

In a recent ruling here, Judge Constance Baker Motley granted Schaefer's motion to dismiss three of EDS' counterclaims, all relating to fraud. Each of the counts, which were similar, asked for $4 million in damages, according to Thomas K. Christo, Schaefer's attorney.

Motley ruled EDS could not claim fraud against Schaefer. The ruling left three of EDS' counterclaims still before the court, although their importance is unclear, according to Christo.

The principle counterclaim of those remaining – one that has gone unchallenged by Schaefer – is breach of contract. Schaefer did not act on that count since it has already paid $1.3 million in a repleven action [CW, March 21].

In its suit, Schaefer claimed the computer system developed for it by EDS was inadequate and substantially similar to Schaefer's original system.

Motley denied the motion to dismiss the remaining two counts for equitable relief and for repleven. In doing so, she indicated repleven had essentially been granted by the court in March, Christo said.

Motley also denied the motion to dismiss equitable relief, which seeks to prevent disclosure of how the system works, seeming to indicate the point was moot since Schaefer had already stipulated to such an agreement, according to Christo.

The trial is scheduled to begin Nov. 14.

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Copies are available pre-paid only from Mercury Communications, Inc. 730-CW Mission, Santa Cruz, CA 95060. $55 includes 3-5 day delivery inside USA. In Calif. add $3.12 tax.

# Privacy Report Warns Against Fed EFT, FBI Switch

By Nancy French
Of the CW Staff

WASHINGTON, D.C. – The Federal Reserve System's experimental electronic banking system and the Federal Bureau of Investigation's (FBI) proposed computerized message-switching system are both serious threats to individual privacy, according to the Privacy Protection Study Commission.

In its final report delivered to President Carter and the Congress recently [CW, July 18], the commission said "current problems with government access to bank records are minor compared with the potential threat to privacy posed by government operation of [electronic funds transfer (EFT)] facilities."

In light of its findings, the commission recommended that "no governmental entity be allowed to own, operate or otherwise manage any part of an electronic payments mechanism that involves transactions among private parties."

As for the message-switching system that would be operated by the FBI as a service to state and local law enforcement agencies, the commission said the system could permit the bureau "to collect and use information to which it might not be legitimately entitled."

While it made no formal recommendation on the system, the commission advised that any decision to give message-switching authority to the FBI or to any other federal agency should be made only if there is no alternative – and such a decision should then be made only by Congress.

### Current System Not Useful

On the matter of EFT and the Federal Reserve's role in it, the commissioner's investigators found the current paper check-clearing system now operated by the Federal Reserve is not a useful source of information for government agencies because the system does not allow checks to be retrieved easily or selectively.

The situation changes, however, when the Federal Reserve uses telecommunications technology for processing private transactions, the report said.

Here, the commission learned, the Department of Justice has requested that the Federal Reserve supply it with information from records of transactions between private parties.

The commission said further that the Federal Reserve System's regulation of the financial community should not be tied to government operation of an electronic payments system. Even if a monopolistic but closely regulated EFT system does emerge, the agency that will have to oversee it should not also be in the role of operating its facilities.

The commission's argument here was supported by its general finding that "when any government entity processes financial records which document the private affairs of individuals, the likelihood and opportunities for other government agencies to obtain and possibly misuse those records increases."

For the Federal Reserve to continue its control over facilities for EFT is unwise, in the commission's view, particularly in light of the possible meshing of ACH services with point-of-sale services. Unless the Federal Reserve limits its EFT operations and begins divestiture now, the inertia of economic circumstance may destroy the policy choice.

Moving to the FBI's message-switching system, the commission focused on three problems it found "particularly pertinent" to the protection of personal privacy should the FBI control such a computerized communications facility.

First, there is little control over how criminal justice information is recorded, maintained and used – particularly when it comes to accuracy, the report said.

Further, the information in such file systems is ordinarily derived or "copied" from another record, which in turn may be a copy of a third. The chances for error in transferring information from one record to another are great, particularly when the first transfer is from a paper record.

These vulnerabilities to error "create a system with inherent accuracy and reliability problems but one which, nonetheless, is used to make decisions that affect individuals powerfully and immediately.

The second problem cited in the report grows out of the current pattern of unrestricted information flows between law enforcement and investigative agencies at all levels of government.

While not critical of this per se, the commission noted that "easier access to information by agents within a unit and greater facility to exchange information between units will increase the potential for abuse."

The third problem relates to the question of federalism. At one level, it is a classic problem of the proper role of the central government in furnishing local services. At another level, however, it is a problem posed by one agency operating the information services on which other agencies depend and thus being able – at least potentially – to control the format of the other agencies' records and to use those records for its own purposes, the commission said.

While such an ability is only potential, the transformation of that potential into actuality has occurred before.

It occurred between April 1971 and February 1974 when the FBI monitored requests for information in the NCIC made by state and local government agencies. The monitoring involved flagging the names of persons in whom the federal agencies had some interest, including 4,700 who had no criminal record, the commission said.

# Florida Fraud Squad Not Yet in Operation

(Continued from Page 1)

to Florida businesspeople; he received the best reception from the American Society of Industrial Security "because it is in that business."

"We are trying to let the business people know perpetrators can be punished," Martindell said. Computer crime would be treated as "another case of grand larceny . . . the investigative procedures are pretty much the same, but without a specialized training program agents can't deal with it."

The Federal Bureau of Investigation has shown some interest in the Florida program and will be presenting a four-week training program in computer crime in Quantico, Va., this summer.

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# Carter Plan to Move OTP Seen as Possible Demotion

*(Continued from Page 1)*

new Assistant Secretary for Communications and Information, who will perform many of the functions previously performed by the head of the OTP," Carter said in his letter to Congress.

The President's Reorganization Office suggested the staff in the Commerce Department be responsible for general policy development and act as the Administration's spokesman on telecommunications issues.

In addition, the old OTP organization, which would be combined with the Office of Telecommunications in the Commerce Department, would coordinate U.S. participation in international communications conferences and negotiations, perform national telecommunications policy analyses and make frequency assignments to government agencies, the spokesman stated.

When OTP and Commerce's telecommunications office are merged, the new Assistant Secretary for Communications and Information will have a staff of approximately 200 people, he added.

### Lost Coherence?

Hollings and Van Deerlin do not want to see the degree of coherence in OTP's past efforts regarding information policy lost in its incorporation into the Commerce Department, and they fear this organization won't have enough of substance to do, the Senate subcommittee spokeswoman said.

If Congress takes no action on this reorganization plan in 60 days – in this case, by Sept. 15 – the President's proposals will go into effect. The first 30 days are considered a "clarification and amendment" period, during which the Administration can answer concerns raised by members of Congress.

During this time period, the Senate and House Communications Subcommittees hope to learn whether all decisions and power regarding information and communications policy will in fact be vested in OMB and the Domestic Policy Staff, the spokeswoman said.

If this does happen, they will propose the creation of a Telecommunications Information Administration headed by an administrator under the Commerce Department, she stated.

What makes an administrator better than an assistant secretary? An administrator has a higher salary and a more visible position in the federal government, the spokeswoman said.

"It would be like giving telecommunications and information policy a house in which to live, rather than an apartment in a high-rise building," she added.

There are already five assistant secretaries in the Commerce Department. The position of administrator would provide national information policy with a better "presence" and the public would have more effective access to their government in this area, the spokeswoman said.

Hollings and Van Deerlin are not alone in their concern over the President's plan. Earlier this month, the president of the American Federation of Information Processing Societies (Afips), Theodore J. Williams, wrote to Carter asking him to take into account the importance of OTP and the National Bureau of Standards' (NBS) Institute for Computer Science and Technology in any reorganization plan.

Williams detailed the activities of OTP and the institute and expressed the hope of computer and communications professionals within Afips that the expertise these bodies have will not be lost.

"As you know, Congress is now reconsidering in committee the Communications Act of 1934, as well as instituting a study through the Office of Technology Assessment on related technologies," Williams wrote to the President.

"We believe that as the Congress focuses on telecommunications, computers and information policies as areas of broad national attention, it is important for the executive branch not only to recognize the significance of this area, but to be in a position to adequately respond to proposals which will be forthcoming from the Congress," he said.

"Further, we believe that a coherent national policy is necessary to, first, allow unfettered growth of this beneficial technology, free of unnecessary regulatory intervention; and second, that government decisions in areas which are regulated (including communications, electronic mail and electronic banking) are indeed made from a broad perspective of national policy considerations, and in a full understanding of the many interrelationships which exist between the regulated and nonregulated sectors of these technologies," Williams added.

The Afips president offered his federation's assistance to the reorganization effort in this area.

# U.S. vs. IBM Traveling Again

By Catherine Arnst

Of the CW Staff

NEW YORK – The U.S. vs. IBM antitrust trial will hit the road again this week with a return appearance in Florida and an overseas performance in London.

The parties have agreed to complete the testimony of two witnesses who are unable to travel by going to them and taking their testimony by deposition. This testimony then will be submitted as evidence.

One of the witnesses will be Ernest Hughes, a retired IBM employee who first took the stand in Miami last December [CW, Dec. 6].

IBM had requested that Hughes and three others on the firm's list have their depositions taken before the defense portion of the trial begins in order to assure their testimony is heard. These witnesses are either elderly or unable to travel.

Judge David N. Edelstein agreed to hear Hughes last December since he would be in Florida, but he rapidly lost patience with the lengthy questioning of the witness and refused to stay beyond the two days he had originally allotted. Consequently, the rest of the witness' testimony will be completed via deposition starting Tuesday in Fort Lauderdale, without Edelstein's presence.

Attorneys will be going to London Wednesday to depose Richard Saalfeld, a vice-president with the Bank of America. Saalfeld appeared in New York in April [CW, May 16], but contracted hepatitis before he completed his cross-examination. Although he is considered to have recovered, he is still unable to travel or even to work full days.

Meanwhile, back in the main showcase of U.S. vs. IBM, Frederic G. Withington, a financial analyst with Arthur D. Little, Inc., is on the stand.

Withington fought his appearance as an expert witness for the government all the way up to the Second Circuit Court of Appeals and lost.

Willing or not, Withington was ordered to comply with his subpoena and testify.

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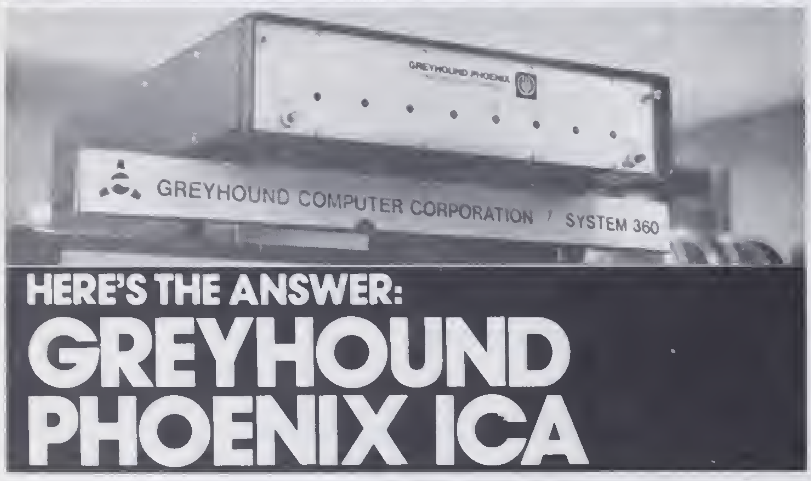

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# Users Vote Against Bell Bill

*(Continued from Page 1)*

bylaws.

TCA has sought to become more involved in outstanding issues that affect telecommunications users; some time ago it participated in a California rate proceeding. The latest resolution is believed to mark the first time that a major user group has taken a stand on an important telecommunications issue.

TCA has thus far sent copies of its resolution and position paper to Rep. Timothy Wirth (D-Colo.), Sen. Barry Goldwater (R-Ariz.) and members of the Federal Communications Commission (FCC), Barnwell said. The TCA position will also be sent to House and Senate subcommittees when future hearings are held on issues related to the Reform Act.

### Competition 'Most Gratifying'

TCA takes the position that the results of FCC-approved competition have been "most gratifying" from the viewpoint of the user. According to the resolution, "numerous new products and services have been introduced to fill voids that existed in the telephone carrier's product lines."

As a result, "latest state-of-the-art technology has become available permitting the business consumer to optimize his telecommunications systems," the paper said.

"The net result is the consumer can now choose from a proliferation of products and services that can fill almost any business need. The disadvantages inherent in dealing with a single supplier have been virtually eliminated."

Commenting on the portion of the Reform Act that would give individual states the power to regulate terminal equipment used in interstate communications, the TCA said this would have the effect of "fragmenting authority over the interstate communications network into 50 separate state jurisdictions.

"The end result would be a hodgepodge of diverse and differing regulatory policies with respect to the rights of consumers to supply their own communications devices."

In opposing the Reform Act, the paper said, "the evidence collected thus far indicates no economic harm has come to the telephone industry as a result of the FCC's selective competition policies. To reverse [these policies] and return to a monopolistic structure would clearly be to the detriment of American consumers and the entire telecommunications industry."

Additional details concerning TCA activities are available from Robert Barnwell, Fibre Board Corp., 55 Francisco St., San Francisco, Calif. 94133.

# *They Were Blazing Mad...*

ROME – A trio of women armed with guns held three Rome University staff members at gunpoint as a male accomplice set a computer center on fire here recently.

Covered with gasoline before being set aflame, the computer was totally destroyed. Damage to the center was estimated to be at least $2 million, according to sources.

The motive for the incident is unknown.

# Compromise Funding Revives VA's Target System

**By Edith Holmes**
Of the CW Staff

WASHINGTON, D.C. — Like a cat, the Veterans Administration's (VA) controversial claims-processing system called Target has come back to life again.

In a conference committee meeting here recently, the Senate Appropriations Subcommittee gave way to the House of Representatives' position on most aspects of the system proposal. The result was a compromise designation of $18.4 million for Target in fiscal year 1978.

The money will permit the VA to go forward with the construction of its central Target facility in Chicago.

The conference further determined that of the three regional centers to be built in Chicago, Los Angeles and Philadelphia, only the Chicago center will be established at the present time.

Speaking for the House Appropriations Subcommittee, Rep. Edward P. Boland (D-Mass.) maintained the system could save the VA between $60 million and $70 million over the next 10 years.

"There is no real substantive reason for turning this system down," Boland said. He added that "members of Congress should not be in the business of choosing agencies' computer systems."

## Washington Update

### Technology: Ignore It, Maybe It Will Go Away

The House Committee on Post Office and Civil Service began hearings last week on a bill designed to revise postal operations in light of the spiraling costs of the U.S. Postal Service.

Contrary to the recommendations made in a spring report by the Commission on Postal Service, the "Postal Reform Act of 1977" (H.R.7700) does not require the post office to investigate the possibilities of electronic mail technology.

H.R.7700 calls for the appropriation of funds for a stronger research and development program within the Postal Service, but "that's as specific as we felt we could get," a spokeswoman for the House Subcommittee on Postal Operations and Services said.

The subcommittee chaired by Rep. James M. Hanley (D-N.Y.), who sponsored the bill along with Rep. Charles H. Wilson (D-Calif.), indicated during hearings on the commission's report that it wanted better R&D and better Presidential and congressional oversight, she added.

"But the technolology changes so fast . . . How can we delineate what we want the Postal Service to do?" the spokeswoman asked.

### A Shot in the DOT

For the National Law Enforcement Telecommunications Systems (Nlets) board of directors meeting in Atlanta in May, the decision whether to permit the National Driver Registry (NDR) to use its statewide communications system was a moot point.

Nlets understood that NDR officials would look elsewhere for a telecommunications network to run their pilot national computer system designed to help states identify drunk and reckless drivers and keep them off the road, according to C.J. Beddome, Nlets executive director.

Accordingly, the board decided the matter wasn't worth another official vote.

But the U.S. Department of Transportation (DOT), of which NDR is a part, expected Nlets to reconsider its January decision that even the pilot system would be too large for the Nlets network to handle, NDR contract officer Jim Lockard said.

NDR considered Nlets concern for the size of the project "honest" and expected to pay for the additional hardware needed to manage the traffic the license validation system would create, Lockard added.

NDR had to look elsewhere after Nlets' first denial and will continue to do so now in the absence of any further word from the organization, Lockard noted.

Among the alternatives NDR is investigating is the possibility that the DOT computer center will develop a network of its own. That network could take longer to build than NDR has to wait, however, Lockard said.

## NYU Program Offers Degree in One Year

NEW YORK — A new diploma program in computer technology which can be completed in one year of evening classes will be offered by New York University's (NYU) School of Continuing Education in September.

The 16-credit program was designed to provide the necessary skills to land an entry-level position as a computer maintenance technician or to upgrade skill levels of individuals already employed in the electronics industry, the University indicated.

Students in the program will meet twice a week from 6 p.m. to 10 p.m. for two semesters.

Tuition is $925 per semester; an admissions test and interview are required.

Applications should be submitted by Sept. 1. Candidates should have completed two years of college, but students with exemplary experience or personal achievement will also be considered, according to the university.

Additional information is available from the NYU School of Continuing Education, Shimkin Hall, New York, N.Y. 10003.

## Course to Cover DP in Art

NEW YORK — A mini course that explores the computer's role in the arts will be offered at Columbia University here in October.

Among the guest lecturers and artists who will address the class are Charles Dodge, an associate professor of music at Brooklyn College; Genevieve Greenwald-Katz, an architect; Ken Knowlton, computer artist and technical staff member at Bell Telephone Laboratories; and Lou Katz, computer facility director at the university's Cancer Research Center.

The course will cost $100. Information is available from Jessica Gordon at Columbia University Program for Continuing Education, New York, N.Y. 10027.

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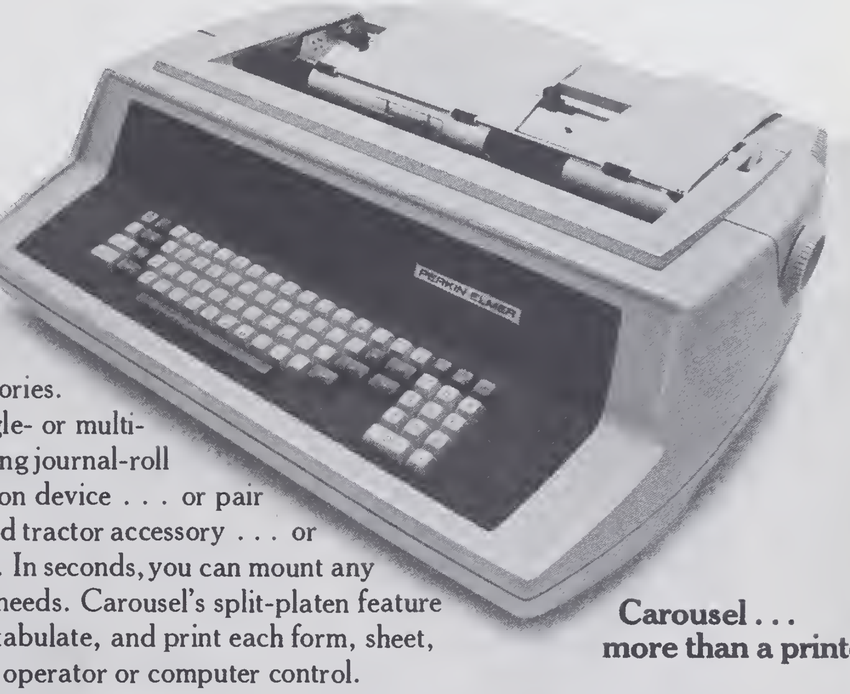

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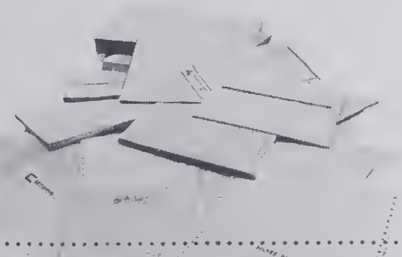

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# Systems Analyst Sought by FBI for Fraud

NEWTON, Mass. — The Federal Bureau of Investigation (FBI) has asked *Computerworld* and its readers for help in locating Henry Joseph Manning, systems analyst wanted for bank fraud and embezzlement and mail fraud.

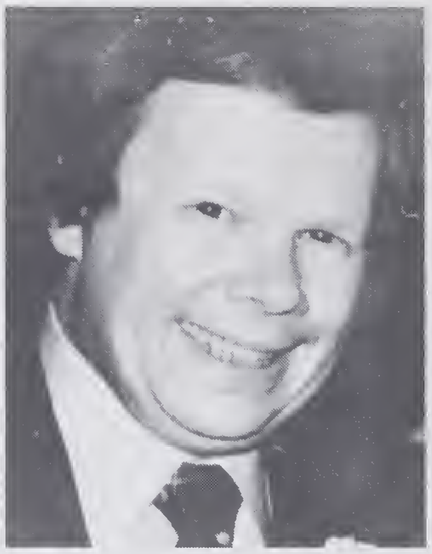
Manning is also known as Paul H. Allen, Harold David Bradley, Allen Collins, Dr. James Parker, David L. Robinson and Charles Tulley, the FBI said.

Manning, who is believed likely to seek employment in the computer field, is also wanted by the State of California as a prison escapee. He has reportedly passed thousands of dollars worth of fraudulent checks around the country.

### Warrant Issued

A federal warrant for Manning's arrest was issued on March 4, 1976 at Kansas City, Mo.

Manning was described as a white male American, born on Nov. 8, 1937 in Denver, Colo., although he has also used Dec. 19, 1941 and April 16, 1942 as dates of birth.



Wanted: Henry J. Manning

He is 6'1" tall, weighs approximately 200 pounds and has brown hair and blue eyes. He has eight slash marks on his inner left arm, a cut scar over his right eye and an appendectomy scar.

### Armed and Dangerous

Manning's Social Security number is 528-44-6655, although he has used numbers 432-26-2981, 457-11-3326, 451-88-4799, 452-23-9281 and 502-43-7063.

Manning has been diagnosed as a paranoid schizophrenic with suicidal tendencies. He should be considered armed and dangerous, the FBI said.

Anyone with information concerning Manning is requested to take no action other than to contact the nearest office of the FBI, the telephone number of which may be found on the first page of most local telephone directories.

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# State, Federal Laws Dealing With Privacy Reach Total of 333

WASHINGTON, D.C. — More than nine states have now passed fair information practices acts that limit disclosure of personal data in state information systems and allow individuals to see and correct their own files.

This year's *Compilation of State and Federal Privacy Laws* published here recently by the *Privacy Journal*, a newsletter "on privacy in the computer age," indicated there are now more than 300 state laws affecting the confidentiality of personal information.

No state has yet passed privacy legislation affecting data collection in the private sector, however, although two — Maine and California — require private and public employers to allow persons to see and correct their own personnel files, the report said.

According to the compilation, 16 states and the federal government now regulate the consumer credit reporting industry and 20 states provide their own privacy safeguards for criminal justice information systems.

The states with fair information practices acts similar to the federal Privacy Act of 1974 are Arkansas, Connecticut, Indiana, Massachusetts, Minnesota, Ohio, Utah and Virginia and, most recently, Indiana.

An additional six states have enacted security safeguards for their state information systems, but do not provide individuals with a means to inspect and correct data about themselves, the report stated.

### Laws Categorized

*Privacy Journal's* 1977 edition includes state and federal laws in the following categories: arrest records, bank record, consumer credit reporting, criminal justice information systems, government data banks, employment records, medical files, polygraphing, confidential privileges, school records, Social Security numbers, tax records, wiretapping and general privacy protections in states laws or constitutions.

The 1977 edition includes descriptions and citations for all statutes, including several enacted since the compilation was published in 1976. It also includes the texts of 28 representative state and federal laws on privacy.

The 215-page book of 333 privacy laws is available for $12.50 from *Privacy Journal*, P.O. Box 8844, Washington, D.C. 20003.

# Scot Gets HP Award For Thin Film Work

PALO ALTO, Calif. — The 1977 Hewlett-Packard Europhysics Award, which carries with it an $8,000 cash prize will go to a professor at the University of Dundee in Scotland.

The winner, Prof. Walter Eric Spear, D.Sc., who is on the staff of the university's Carnegie Laboratory of Physics, is being honored for his contribution to the physics of thin film semiconductor technology.

The award, which is presented by the European Physical Society (EPS) for outstanding achievement in the field of solid-state physics, is donated by Hewlett-Packard S.A., HP's European headquarters organization.

Spear, whose academic title is equivalent to a Ph.D., is being cited for work that led to the discovery that electrical properties of thin film semiconductors could be altered by introducing impurities. This opened the way to a new range of semiconductor devices.

The first application of these devices is in the fabrication of a solar cell that absorbs the sun's rays better than previous materials. In addition, the technique lends itself to the fabrication of large solar panels at lower cost.

Spear will receive the award at the Third EPS Condensed Matter Division Conference in Leeds, England, this month.

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Several opportunities exist for individuals with three to five years experience in mini-computer software systems development to implement data entry applications and operating systems software. Implementation responsibilities include detail design, structured implementation and testing of System 3300 software. These openings offer programmers an opportunity to learn contemporary software development techniques while contributing to the success of this new product line.

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System 5000 uses the same mini-computer base as the System 3300 to address customer requirements in accessing and maintaining the numerous files of information necessary to conduct business on a daily basis. While closely related to the data entry market, System 5000 provides power tools for managing and tracking information *after* it has been entered with a computer. Sophisticated file management software allows the System 5000 user to enter, retrieve, update and process information in an on-line, real-time manner.

Specific opportunities exist in the System 5000 group to design, implement and test new file management software. Individuals with three to five years experience in implementing mini-computer turnkey systems will find an opportunity to apply their problem-solving skills while learning contemporary software development techniques. Prior experience in operating systems and/or data base management is required.

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You'll do top-down design and then implement in one of the system's three languages.

You'll need five to ten years experience in program design and coding in assembly and higher level language, including mini-computer experience.

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### Diagnostic Programmers

We are seeking flexible Diagnostic Programmers with 5-9 years experience to be responsible for the creation of diagnostic functional specifications, review of engineering changes, and design critiques of new hardware. This will include working with a variety of hardware/software systems, generating new diagnostics, and enhancing current ones. The ability to interface effectively with design engineering, field engineering, and all facets of the manufacturing process is essential.

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### Drafted by Governor's Commission

# Indiana Enacts Privacy Laws Covering State Agencies

**By Molly Upton**
Of the CW Staff

INDIANAPOLIS — Indiana's legislature and governor have approved a bundle of privacy laws, many of which appear to parallel those applying to federal agencies under the Privacy Act of 1974.

The state's Fair Information Practices Act does not apply to the private sector and covers only state agencies that report to the governor. This excludes those under the state auditor, treasurer, secretary, attorney general, the department of state police and the state-supported institutions of higher education.

This law provides a procedure by which records kept by various state agencies may be declared confidential and declares that after July 1, 1978, all records are public except those categorized as confidential.

Under another privacy law, information retained in both manual and computerized files must be deemed relevant and necessary to that agency's purposes; all other data shall be expunged upon annual review.

Individuals have the right to see and correct their files. Agencies must provide the file's recipients with either a correction or a copy of the subject's statement disputing the record.

Under still another law, state agencies must file an annual report with the governor delineating the type of personal information systems it maintains as well as how to contact the person immediately responsible for keeping the system in compliance with the new privacy laws.

As of Jan.1, 1978, Social Security numbers may not be required except by revenue, welfare, employment and state personnel agencies, unless the agency is required by federal law to obtain the number.

Limitations will be placed on the sale of compiled information by the Bureau of Motor Vehicles.

### DP Oversight Committee

A data processing oversight committee, established by the legislation, is in charge of "coordinating the operations of the various data processing systems within the administrative branch of state government [and] developing consistent policy . . ." It is also responsible for "promoting economical, effective and integrated DP services, operational security and adherence to the principles of the code of fair information practices for individual privacy."

The laws also differentiate between criminal history and criminal intelligence information, and they limit the type of information that may be collected and stored on individuals for criminal intelligence purposes.

In line with other edicts attempting to eliminate extraneous information, a law permits individuals with no records of prior arrest and no criminal charges pending to petition to have their mugshots and fingerprints destroyed if no criminal charges are preferred or if charges are dismissed.

If the petition is granted, the arresting agency would not be permitted to forward a record of the arrest to any local, regional or statewide repository for criminal history information, according to one of the new laws.

### Preparing for Implementation

The laws were drafted by the Governor's Commission on Individual Privacy. The commission was established two years ago and it disbanded upon passage of seven of its eight proposals, according to James T. Smith, liaison between the commission and the governor's office.

Prior to the new legislation, the state had no laws addressing privacy, he said.

In order to prepare for implementation of the Fair Information Practices Act, each state agency directly responsible to the governor is to go over its records of personal information and sort out those it thinks should be maintained on a confidential basis.

The governor and legislature will then declare as confidential those records they vie as falling in this category.

### Annual Inventories

State agencies are also required to conduct annual inventories of their records and justify to the Commission of Public Records their retention of, or recommendation for disposition of, various records.

Although the Bureau of Motor Vehicles (BMV) may continue to sell individual records, effective Jan. 1, 1978 it will be allowed to sell compiled records only when the purchaser certifies the information is to be used only to notify owners of vehicle defects or for research or statistical reporting purposes. In such cases, individual identities must be properly protected and not ascertainable from the published reports or research results.

The DP oversight committee consists of representatives of the governor and auditor, the director of the Budget Agency and the Commissioner of the Department of Administration.

### Intelligence Records Defined

Criminal intelligence records are defined as "information on identifiable individuals compiled in an efort to anticipate, prevent or monitor possible criminal activity."

As of Oct. 1, 1977, such data may be collected and maintained "only if grounds exist connecting the individual with known or suspected criminal activity and if the information is relevant to that activity," according to the legislation.

"No information is to be collected or maintained about the political, religious or social views, associations or activities of any individual, group, association, corporation, business or partnership unless such information directly relates to an investigation of past or threatened criminal acts or activities and there are reasonable grounds to suspect the subject of the information is or may be involved in criminal acts or activities.

"Criminal intelligence information is declared to be confidential and may be disseminated only to another law enforcement agency . . ."

The disseminating agency must be satisfied that the recipient has a genuine need to know and that it will safeguard the confidentiality of the information, the law said.

PUT ON
A BURST OF SPEED.

## DP on Fiche

GLOUCESTER POINT, Va. — An annotated bibliography on the computer's impact on society is available on microfiche from the Virginia Institute of Marine Science.

Prepared under the auspices of the Education Board of the Association for Computing Machinery, with a grant from the National Science Foundation, the bibliography contains more than 2,000 entries of books, articles and other items, most of which are annotated.

The list is alphabetical by author and is stored in a hierarchical storage and retrieval system at the University of Wisconsin. Special-purpose subsets may be obtained.

The complete set costs $2.30 for U.S. orders and $3.30 for others from Gerald L. Engel, Department of Computing and Statistics, Virginia Institute of Marine Science, Gloucester Point, Va. 23062.

### *Model Legislation Needed*

# Lawyers Urge Industry Action on Taxes

**By Molly Upton**
Of the CW Staff

SAN FRANCISCO — The computer industry could and should play a more active role in deciding how its products and services are taxed, speakers at a recent Computer Law Association conference here agreed.

The DP industry needs to formulate model legislation and take more action regarding assessment of equipment, they said.

Currently, various states have asked what the industry position is on taxing various aspects of DP, according to Al Eisenstat, vice-president and corporate counsel of Tymshare, Inc. However, the industry does not have a succinct statement of its position.

It will be inordinately difficult to get the various segments of the industry to agree on anything more specific than "nothing related to DP should be taxed" and "there should be no retroactive taxation" Eisenstat pointed out.

But if model legislation could be drafted, perhaps it could be distributed for use by groups in various states as they wish, rather than factions such as software and services firms hammering it out on the national level, he suggested later.

At the very least, there should be some legislation recommending uniform treatment of DP products and services on an interstate basis, he said.

According to Eisenstat, the Association of Data Processing Service Organizations (Adapso) is the logical group to draft the model legislation, since it represents several areas within DP. He said he will continue to move to get Adapso to allot funds to have professionals help draft the legislation.

Attorney Robert H. Fabian told attendees they can help themselves by developing and encouraging the use of services which evaluate current market value and comparable sales prices of DP items.

Often, because tax authorities generally are not willing or able to apply the same techniques to DP gear as to other areas, assessors may look to industry sources for estimates of the current market value of DP hardware and systems, Fabian said.

The industry itself must be aggressive in steering the course of events in the tax area because of the inconsistencies and wide discrepancies which exist both in definitions and in motivation from one taxing jurisdiction to another, he stressed.

Michael Berwind, an attorney with Chickering and Gregory, said records of comparable prices may be a valuable aid in dealing with tax problems at the federal level.

The Internal Revenue Service may look to the rental terms of competing lease proposals and at other vendor or user documentation in arriving at the "fair rental value" of equipment in making a lease/-purchase determination, Berwind said.

## New York Set to Hear DP Tax Suggestions

ALBANY, N.Y. — An informational hearing for all interested parties will be held by the state tax commissioner here to gather recommendations for regulations taxing DP in the state.

These will then be considered and submitted to the state tax commissioner. If they are approved they could become regulations, according to Peter Crotty, deputy commissioner and counsel for the State Department of Taxation and Finance.

There is a growing dispute in New York State over what is subject to sales tax. A 1966 statement unearthed by Robert Sherin, who is involved in fighting DP taxation in several states, says that software is exempt from taxation.

The following question and answer: "Q. 194. Are services involving the analysis, planning, design and programming of electronic data processing systems exempt?

"A. Since this service is not specifically made subject to the sales tax under Section 1105, it is exempt."

But then in 1973 the New York law on sales and use taxes seemed to take an opposite view. There, Section 55-069 states, "The furnishing of information by printed, mimeographed or multigraphed matter or by duplicating written or printed matter in any other manner, including the service of collecting, compiling or analyzing information of any kind or nature and furnishing reports thereof to other persons, but excluding the furnishing of information which is personal or individual in nature and which is not or may not be substantially incorporated in reports furnished to other persons . . . " is taxable.

Some firms claim they received notices of deficiencies in tax payments prior to 1973 — before the regulation was written.

Crotty admitted that past pronouncements weren't "full approaches" and have led to the differences of opinion.

The meeting will be held at 10 a.m. on Aug. 23 in Room 206, Building Nine of the State Office Campus here in Albany.

Those interested in appearing at the hearing should notify Arnold Glass of the Sales Tax Regulation Task Force, Building 9, State Campus, Albany, N.Y. 12227, and should prepare six copies of their statements.

Those who wish to enter statements in the record should submit them by Aug. 11 to the above address.

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# Bell Companies Get Nod to Collect Political Donations

By Ronald A. Frank
Of the CW Staff

NEW YORK – Bell System operating companies have received the go-ahead to collect contributions from management employees for use in funding political campaigns as a matter of official company policy.

According to an announcement issued this month by AT&T chairman John D. deButts, individual Bell companies will be able to set up political action committees (PAC) at the discretion of their respective managements.

These committees will be empowered to collect political contributions from company paychecks, in accordance with the preferance of individual employees.

An estimated 17,000 Bell System employees at the district management level and above will be eligible to participate in the voluntary program, according to an AT&T spokesman. Employees at the "E Level," or those making about $25,000 per year and over, also will be eligible.

### Like United Fund

Administrative machinery for setting up the PACs will be handled by the operating companies in much the same way that funds are now collected for United Fund drives and other charities, according to an AT&T spokesman.

In cases where employees do not instruct that contributions be donated to specific candidates, the PAC will determine which candidate is to receive the funds, the spokesman said.

Two operating companies, Pacific Northwest Bell and Ohio Bell, are now setting up PACs and other units of the Bell System will probably consider similar actions, although participation is not mandatory, the spokesman noted.

AT&T itself is expected to have a PAC in operation later this year, he said.

Initially the PACs will be aimed at national political parties and candidates for federal office. But support for state and local candidates could also be forthcoming where permitted by state law.

### Two Problem Areas

An expert on election practices said two possible problem areas could arise with the AT&T policy. First, by virtue of AT&T's monopoly position, its PAC-collected funds could exert an unusual impact on an election simply because of the company's number of employees and market position.

Secondly, if employee contributions are not kept strictly confidential, members of management could exert pressure on an employee to contribute funds to a candidate favored by management, the expert said.

An AT&T spokesman denied this would be a problem, saying information about contributions would be known only to the employee and members of the PAC. Further, solicitations for funds would be made by "equal level" employees so an employee would not be put in the position of having to respond to a request for funds from a superior, he said.

Administrative and clerical costs of the PACs will be "identified separately and not used for ratemaking," the spokesman said.

Each PAC will be broken down into three subcommittees. The administrative committee would solicit the funds from fellow workers; the finance committee would be responsible for accounting and recordkeeping; and the dispersal committee would be responsible for contributing the funds.

In a letter to Bell operating companies, deButts said the PACs "provide a workable and honorable political fund-raising tool to support our democratic electoral process."

## Contest for Hobbyists

NEW HAVEN, Conn. – A five-year membership is the prize in a name-the-users'-group contest sponsored by computer hobbyists exchanging information on the use of Heathkits.

The more obvious choices are ruled out because Heath Co. objects to use of their trademarks by an independent organization.

Entries and requests for further information should be sent to Charles A. Floto, Apt. 10, 267 Willow St., New Haven, Conn. 06511.

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## Hessians' Privacy Abused De

Special to Computerworld

WIESBADEN, Germany — The Hessian Data Protection Law, now six years old and the first of its kind, is being rewritten to conform with a new federal statute set to go into effect here next year.

Although this will be a major challenge, according to Dr. Spiros Simitis, Hessian data protection commissioner, it will not overshadow enforcement of the present law.

In his sixth annual report, Simitis cited a number of cases which show that despite six years' experience with the law, "public administration" does not always give it the necessary thought and priority.

The following incidents have occurred recently:

- Illicit communication of personal data of insurance agents, d
involved.
- Insufficient
regulations when
search group.
- Acquisition
town clerk's off
bound to secrecy
- Passing out-
registration data
paper.
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private firms with

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## Own Programming Business

# Prison Inmates Find DP Pays Off Both Inside and Out

**By Ann Dooley**
Of the CW Staff

STILLWATER, Minn. — The DPers at Stillwater Data Processing Systems, Inc. (SDPS) enjoy their new trade and look forward to continuing in DP when they get outside.

For them, "outside" means the other side of the Stillwater State Prison walls.

Nearly all the DP staff are prison inmates who work for SDPS, a privately owned company, that was set up under the Minnesota Department of Corrections' private industry program.

The program is an attempt to rehabilitate prisoners and provide them with skills and training which they can use when they get out of prison.

Employees of SDPS receive up to $4.62 an hour for an eight-hour work day compared with an average inmate's top wage of $1.75 an hour. A lead programmer recently earned $1,042 in one month. Employees also receive liability insurance and workman's compensation.

Wages, which are comparable to those on the outside, enable the inmates to pay the prison for room and board — up to $120 a month. They are also able to help support their families, make restitution and save money for when they get out of the prison.

"The $100 'gate money' just isn't enough," according to Stanley Wood, private industry program director.

"We try to make it as much like the outside world as possible, with the same expenses," he added. "We are even trying to see if employees can qualify for unemployment benefits."

### Competes With Outside Firms

Another reason for paying comparable wages is that the company contracts with outside businesses and SDPS's competitors could file claims of unfair competition against the prison.

In addition to paying wages, the year-old company pays all operating costs including rent for facilities from the state. Revenue for the month of April was just over $7,000 and it has been increasing each month. Although the company has not yet been able to meet its monthly operating costs of $7,700, it expects to do so by the end of the year — one year sooner than originally anticipated, Wood said.

SDPS also operates with loans from the Bush Foundation, which gave it $38,000; the Bremer Foundation, which will give $17,000 over a three-year period; and the Minneapolis Foundation, which is guaranteeing a $38,000 bank loan, pegged to 1.5% more than the prime rate. The loans are to be repaid from earnings.

An inmate-owned business such as SDPS is one of the first of its kind, according to Wood, since private industry within prison has not been allowed for many years. In the past, prisoners were often used as a source of slave labor to make license plates or other mass-production items. As these conditions became known to the public, private industry was banned from prisons.

SDPS does any kind of custom programming such as payroll, inventory, accounts receivable or sales analysis. It operates by remote job entry on-line to the client's computer from two terminals and a keypunch machine located at the prison.

The firm plans to install a computer on site within the next year which would enable it to go into time-sharing, Wood said.

### Variety of Customers

Its customers include the state department of administration, Hennepin County, the University of Minnesota, Northern States Power Co., General Mills and Blue Cross-Blue Shield of Minnesota.

"We go out and solicit business and if we can do the work for them at a cost-effective rate, we'll do it," according to William Ward, president, marketing representative and one of the few noninmates in the company. "If I didn't think we were delivering, I'd say the whole concept was a bunch of B.S.," he said.

"That's not to say we're opposed to addressing sociological matters along the way if we can. But we must deliver a quality product at a competitive price," James Willman, operations manager, said.

Clients don't seem to be overly concerned with any possible security leak or computer misuse, Wood said. The employee inmates take an oath that no information will be divulged. In addition, operations are designed so employees work only on their assigned program and don't have access to any other information from the CPU at the client's site, he explained.

The staff includes six inmate DP employees supervised by Willman, who is also an inmate. Their number is scheduled to increase to 18 by next fall, Wood said. The six staff members and Willman are occasionally helped by a college intern and by Ward, who does the marketing.

At first, few minority inmates were applying, Wood said. But the company has adopted an affirmative action program and is making a push to encourage blacks, Indians and other minorities to upgrade their skills and get over the fear of failing, which is a primary problem, according to Wood.

Trainees take courses provided by the state of Minnesota and then receive inservice training through the company, of "a quality equal to any vocational program," Wood said.

Most of the trainees and employees would like to stay in DP. Donald Gray, formerly a drafting trainee, said one reason he likes computers better is because he earns three dollars an hour.

"It's a much better opportunity than turning out twine. I figure I'll be able to save about $10,000 if I'm here another two to three years," he said.

Willman also feels he will stay in computers when he leaves prison. He has been able to save $16,000 and to help support his family while working as manager for the company.

The large difference in wages between this and other prison employment under the private industry program has not caused any jealousy in the other inmates, employees said.

It seems to give the others hope to "see a program working for a change instead of dying on the vine as so many ideas there do," one worker said.

The company pays released employees a salary for six weeks after they leave prison. Often, they are hired immediately by a firm they did programming for while they were in prison, Wood said.

When hiring or choosing trainees, Ward doesn't look into the inmates' conviction or prison record, he said. "We're not concerned about what the individual is here for. We're interested in his present and future."

Several area computer firms loaned experts to the prison to help set up the company. SDPS's board of directors consists of executives from Control Data Corp., Honeywell Information Systems, Burroughs, Fabritec, Blue Cross-Blue Shield and General Mills as well as Willman and Ward.

# DP Enters Realm of Stitchery

SOUTHFIELD, Mich. — Computerpoint, Inc. here has begun to offer custom needlepoint patterns on canvas enabling needlepointers to recreate a picture of their choice in stitchery.

Martin Bernstein, vice-president of the firm, declined for competitive reasons to provide any details on his company's techniques, but he claimed that proprietary software developed by his firm enables a computer to make a pattern duplicating a picture that calls for colors of yarn selected from as many as 900 shades.

As many as 10 tints of one hue may be used to produce realistic results, giving lifelike dimensions to a picture or portrait. Individuals who have ordered custom patterns from the firm furnish artwork that "runs that gamut of American life," he commented. Many people want to have pictures of their deceased children reproduced, he said.

The needlepoint artwork is available in kit form, called the Picture Perfect Needlepoint Kit, and includes the computer-generated pattern, instructions, needlepoint ruler, canvas and Persian wool yarn.

Currently marketing the kit in test areas, the company is expanding its marketing across the country.

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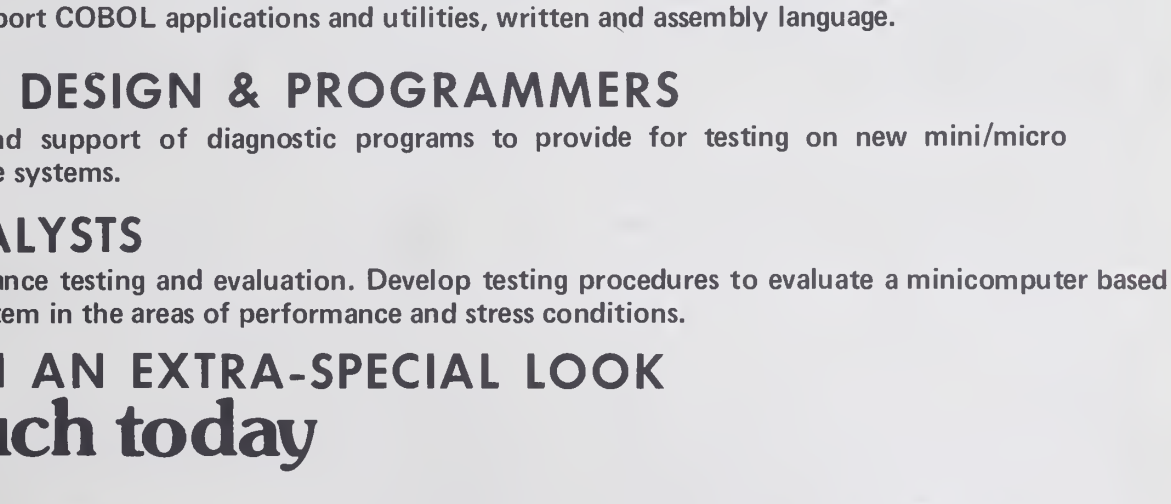

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# Editorials

## *Illumination by Blackout*

The increasing reliance of modern American society on computer systems was clearly illustrated during the recent power blackout in New York City and Westchester County [CW, July 18].

The effects of a blackout such as the one experienced in New York would, of course, be catastrophic whether or not there was a reliance on computers. But the increased reliance on computers – as well as other electrical "tools" or appliances – heightened the scope of disaster.

Consider the following, for example:

- Banks would not have been able to conduct business if they had reopened in the daylight hours. Without access to their computers, there was no way of knowing – quickly – such things as account balances.
- Hotels could not tell if travelers arriving in the city during the crisis had reservations. In many cases the computers were down and there were no hard-copy lists of people expected.
- Airlines – even in airports like Newark, which kept operating – often could not tell if passengers had reservations since they were tied into computers through switches in the affected area.
- In several hotels which have installed electronic door locks controlled by computers, the rooms were automatically locked and people who struggled up flights of stairs to reach them could not get in.

All of these things were minor inconveniences when compared with the massive problems that faced New York during the blackout.

But as society increasingly relies on computer systems, the effects of power outages and the like is sure to grow.

## *A Boon for All*

The Office of Management and Budget is planning to review how the government procures and uses computer systems as part of President Carter's reorganization program [CW, July 11].

This is welcome news.

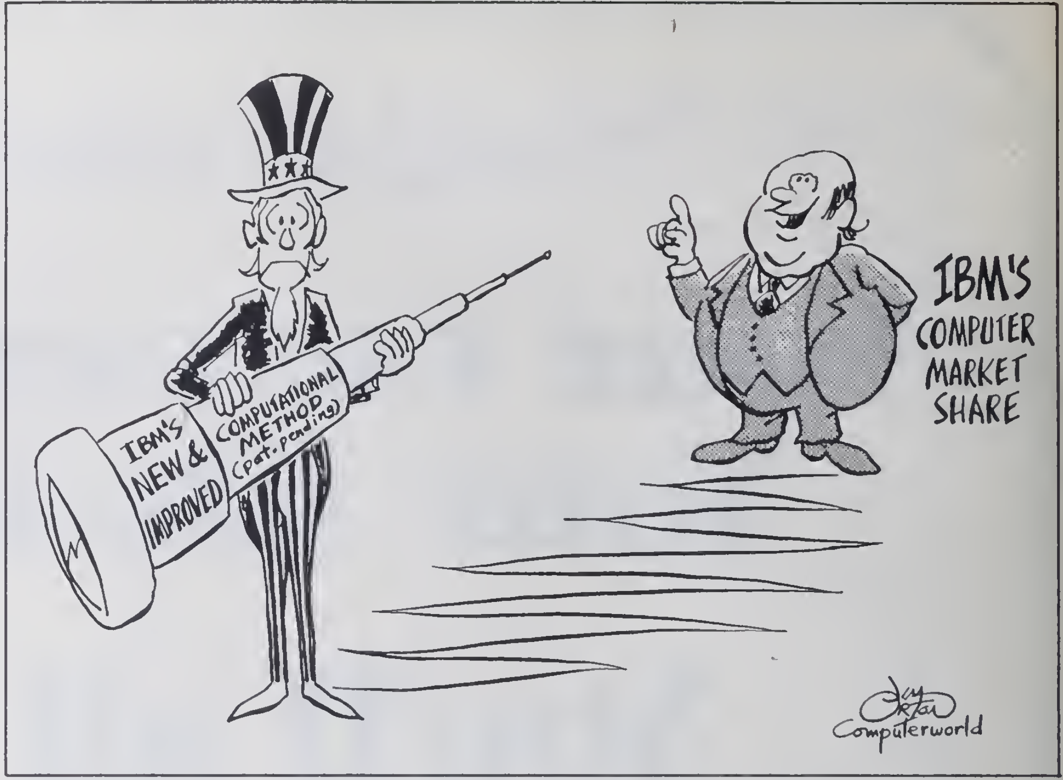
The executive branch of the government is the largest computer user in the world. While many of its systems are used for rather esoteric tasks such as intelligence monitoring and spacecraft control, there are also many applications similar to those of the average business user.

Because of this, the promised study could be beneficial in two ways.

First, any reduction in inefficient use of computers would help keep the cost of government down while, at the same time, providing increased services to the taxpayer. More efficient computer use could be a step toward the goal of making government more efficient, and more efficient government would benefit everyone.

Secondly, techniques learned by the government in improving the efficiency of its enormous computer investment may have direct implications for private-sector users. By identifying areas of inefficiency and developing ways to overcome them, the government could point the way for private enterprise to overcome its own inefficiencies in computer use.

It's a program worth the effort and worth monitoring.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*'You Simply Look at Me Through the Big End, Uncle.'*

# Letters to the Editor

## Ribicoff Bill Could Be Vehicle For Protecting DP's Innovators

There is a strong link between the two editorials in your issue of July 11.

First, I was very impressed with John Hersey's testimony. The man's brilliance is evident even in fields other than his own. I agree with the proposition in the last paragraph of the lead editorial, which suggested that some new way be found to protect creators and innovators.

The Ribicoff bill also answers a new problem in a new way (in the old days, we could not fit a 100K program into a 10K machine, either). Why not use the Ribicoff bill as a vehicle to develop protection for the innovators.

Peter F. Gundell
New York, N.Y.

## Unfortunate Choice of Example

I must take issue with one of the assumptions in your editorial of July 11 endorsing the Ribicoff bill. The comparison of embezzling to armed robbery ignores the fact that the armed robber threatens the lives of the persons robbed.

It would be more reasonable to compare computer crime to grand theft, in which large amounts may be stolen, but without immediate threat to the life of the victim.

The implicit assumption that property is at least as important as human lives is precisely the attitude that has alienated a significant portion of the American populace from what it sees as an insensitive corporate society.

I hope this was merely a poorly chosen example and not an indication of your basic philosophy.

Darrell G. Tangman
Minneapolis, Minn.

It was a poorly chosen example. Ed.

# Data Past

### Five Years Ago
### July 26, 1972

MONTVALE, N.J. – This year marked the end of the Spring and Fall Joint Computer Conferences. In 1973 they were combined into one national show – the National Computer Conference and Exposition.

– – –

SAN FRANCISCO – The first IBM 360/30 with 256K was installed in the San Francisco Data Center of Greyhound Computer Corp. by Computer Hardware Consultants & Services. In a test comparing the 256K Model 30 against a 256K Model 40 on a series of heavily CPU-bound compiles, Greyhound found "the job took only 18 minutes with the 256K 30 as compared with 14.5 minutes on the 40," the center's general manager said.

### Eight Years Ago
### July 30, 1969

NEW YORK – The Service Bureau Corp. canceled the marketing of Call/360 DataText and planned to terminate the service Oct. 31. The IBM subsidiary said the move was based on the company's continuing evaluation of its business and services.

## A Job That Needs Doing

It is with bewilderment that I continue to read letters such as the one from T.C. Bartz, headlined "NCC Showed Interest in Certification Low" [CW, July 11].

His conclusion, based on the low number of attendees at the Institute for Certification of Computer Professionals (ICCP) sessions, was that "interest" rather than "necessity" is the mother of invention. The DP practitioners indeed may not be interested in certification, but they sure as hell need it.

Certification coupled with codes of ethics, conduct and good practice, as well as curriculum, accreditation, self-assessment and continuing education, is the basis for a much-needed DP "profession" to protect the public from poor practice.

ICCP is working on just that – a profession. If people like Bartz aren't interested in necessity, we regret it. We hope they change their minds, but we can't wait for them to get interested.

To paraphrase what Donn Parker said at NCC and recently printed in CW regarding the issue of ethics, we in DP have had only 25 years to do what the other professions took hundreds of years to do. But we have a job to do and we need to do it before "something" is legislated independent of our DP constituent societies.

J.J. Martin
Public Information Chairman
ICCP
Chicago, Ill.

## Another Rave for 'Waves'

I am enjoying immensely the excerpts from *The Waves of Change* by Charles P. Lecht in the last several issues of *Computerworld.* This type of publication in your newspaper reflects well on the *Computerworld* image and enhances your professionalism.

I will certainly purchase Lecht's book when it becomes available and I hope CW will follow with additional book excerpts of the same caliber.

Thomas F. Meurer
Wellesley, Mass.

*(Other letters on Page 20.)*

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## Human Skills Needed

# Experts Explain Ways to Improve DP Teams' Output

**By Jack Stone**
Special to Computerworld

A growing but generally unpublicized movement toward understanding and improving the processes of building effective work teams in DP centers is under way.

The issue is briefly stated as follows: The typical formal DP organization is built upon the hierarchy of the manager and the managed, the supervisor and the supervised. Further, for proper control, technical personnel are coded into specialist slots — programmers program and analysts analyze.

Yet most significant projects involve the formation of ad hoc task forces or project groups that somehow must solve DP problems that cannot be solved by the established organization or by individuals working alone.

One major reason why many such projects fail is that the people suddenly thrust into the team environment are not certain how they should operate in that milieu or how the team itself should operate. The solution to effective teaming, therefore, is dependent upon the host of factors involved in human communications, including the full gamut of human behavior and human needs characteristics, a skills area notably lacking in our industry.

William J. Frost and Carol M. Vaughan of the U.S. General Services Administration are key members of a current national effort to study how DP teams and work groups can be structured and operated to increase individual fulfillment and improve organizational efficiency and effectiveness. (They will be reporting on their work at the annual conference of the Association for Computing Machinery Special Interest Group on Computer Personnel Research in Washington next month, a meeting which promises to be the best one of its kind in years.)

Here are the highlights of the first part of my interview with them.

*Q: Just what does team building mean?*

**Vaughan:** Team building (or team development, which is perhaps a more acceptable term) is a set of strategies designed to improve results from an organization by creating an atmosphere of confidence and coordination through first developing consistency in what people want and what the organization needs. Second, it establishes a better climate of working together.

*Q: Doesn't the project manager already try to accomplish these goals?*

**Frost:** Well, the typical DP project manager has the responsibility, but he usually takes an authoritarian approach. He distributes work, provides methods and techniques, and expects the supervised to produce on his timetable. What results is that the typical team member is turned off by the project organization and loses incentive to produce. He turns out a minimally acceptable product which, when added to the output of other frustrated team members, results in project failure.

Peter Peterson recently wrote, "While many have said there is a danger that the computer will begin to think like men, a much greater danger is that men might begin to think like computers." One of the major problems in computer centers today is that too many DP supervisors act like machines and fail to apply the human understanding necessary to get DPers to work together.

*Q: I hope you aren't suggesting the typical DP project manager should have a B.A. degree in behavioral psychology.*

**Frost:** Oh, no! But the manager needs to have an understanding of and some training in the implementation of processes which help individuals change their attitudes and work for the team instead of themselves. Success in DP is sorely contingent upon the successful development of the project team, because it is only the effective, viable team that captures the creativity of employees at all levels of the organization.

It helps develop a problem-solving attitude on the part of team members and builds problem-solving actions into the work process. The effective team — one that really accomplishes its mission to the complete satisfaction of its members — has closely aligned the psychological needs of its members to the needs of the organization. It is the model of intraorganizational communications.

## The Human Connection

**Vaughan:** You see, the major role of the DP department should be to assist in the creative decision-making process, based upon the free exchange of ideas and concepts. Then it should help translate these thoughts into practical and efficient automated systems. Creativity is simply not an activity which is directed, but is the result of open and unimpeded investigation and discussion among team members. We strongly feel that team success depends on creativity, that creativity comes from a democratic environment and that the authoritarian work group will in the long run almost assuredly lead to poor performance.

*Q: It seems to me the project manager has to be a Renaissance man to accomplish the goals you set forth.*

**Vaughan:** Well, it may seem so, but actually it's not too bad. We have identified five disciplines involved in the development of a DP team: planning, logic, systems, human behavior and human needs. Individually, the planner says, "You have to know where you are before you can decide how to get where you want to go." The logician says, "If you want to solve problems, you should begin with the thinking process."

The systems analyst says, "What is needed is a plan that brings each subsystem up to standard in the specified time to allow the entire developmental effort to work effectively." The behaviorial scientist says, "After the basic physiological, sociological and psychological needs are met, people will seek self-actualization."

*Q: How do you put all of this together?*

**Frost:** The basic principle of team development is that the team is used to effect change in the individuals' attitudes and style of behavior. All of the team members must assemble as a functioning group and together examine the behavior of each team member. Specifically, the team must examine the present attitudes and styles of the members; the effects of these attitudes and styles on the team as an entity and on the output of the team; and the choice and impact of alternative styles and attitudes.

For success in this endeavor, the entire group must recognize several things; conflict of ideas is a necessary step in the change process; attitudes must be developed and maintained to support a creative environment; and change is not uniform or consistent, but can be achieved only over long periods of time with persistent effort.

*This interview will be concluded in next week's column, which describes the Frost/-Vaughan approach to DP team development.*

*Letters on topics related to the human connection with DP systems can be addressed to Stone at Suite 222, 2233 Wisconsin Ave. N.W., Washington, D.C. 20007.*

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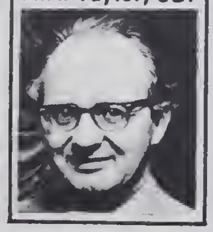
## Unprecedented 'Test'

# Blackout Shows Lack of Network Contingency Plans

## The Taylor Report

By
**Alan Taylor, CDP**



The recent New York blackout, which suddenly isolated some 10 million people, provided a test of computerized systems in practical operation which was unprecedented in scope. The 1965 blackout gave no comparable test of modern-day computer usage, its prime result being simply the closing down of many mainframes where power, air conditioning and elevators were down.

Networks, although some were operational, were not nearly as important as they are now, and few complaints regarding their operation were voiced.

In fact, few complaints regarding the operation of computer networks were heard during the recent blackout. But this seems to be because of the lack of understanding as to their role in some of the difficulties of the situation or because of apathy.

Perhaps the worst example of poor network operations came from the airlines. The New York area has three airports — La Guardia and Kennedy in the city and Newark in New Jersey. Newark has a separate power supplier. A number of airlines, including TWA, have centralized their reservation systems so someone in Newark wanting to reserve a flight leaving from Newark has to go through Manhattan — even when Newark is operational and Manhattan is not.

When the blackout was three hours old and it was known that it would last until after 8 a.m. the next morning, I was faced with the job of getting to Boston from Newark. I knew — from American Airlines — that the planes after 8 a.m. from Newark were sold out, but there were two flights at about 7 a.m. on Eastern and TWA. These, American told me, were available.

But trying to book them — that was the rub. I did and was told by TWA that because its Manhattan terminals were down nothing could be booked until after power returned (that was after the plane took off).

This, the airline told me, was the situation with all the airlines that had (so American said) moved their Newark reservations to Manhattan.

American was a recent exception to the rule, I was told when I reported to American my prior call. If American would let me reserve seats on TWA — which it might or might not — then fine. But TWA itself could do nothing.

American could do something and did, for which many thanks. But where were TWA's "terminal down" contingency plans? Do they exist? If not, why not?

### Half Better Than None

TWA and, presumably, the other airlines were not really down. Its Manhattan office was not really isolated. TWA could communicate with the outside world with its own computers simply through the use of telephones — by calling American, if necessary. More likely, it could call TWA in Philadelphia or Washington. Then reservations could be given and confirmed.

The procedure would be slower than normal, but the airline would certainly be able to cope with bookings for planes flying during the blackout. Half a working system is better than none, but nothing was offered. That was the size of the failure.

Hotel networks faltered just as much when the terminals dropped power. The Sheraton and the Holiday Inn (and presumably others) had rooms, but they stopped booking them even though the mayor and others were urging everyone to stay put. (This was in the La Guardia area, too). Excuse: The computer (i.e., the terminal) was down.

The hotel network is not the same as the airline network case. Here we are dealing with the loss of control of immediately needed local resources rather than the lack of access to a remote central computer. If TWA's central system had gone down, no one would have been able to confirm our reservations, so central's being up was essential.

But in the case of hotels, it really didn't matter whether the central computer was down. What was needed was responsible local control of local resources.

Again, what was needed was a terminal-down contingency plan taking into account possible and entirely foreseeable requirements for the optimal use of those resources. But at least an hour into the blackout no such optimizing operation was in progress. Again, why not?

### Con Ed Responsibility

Yet, with all the problems of the networks, the real blame for the network failures must go to Con Ed. As Mayor Abraham Beame said later, Con Ed's story had been that the lesson of the 1965 blackout was learned and Con Ed would not get knocked out again.

Yet, some time before the blackout, it knew that total crash was possible. It may have known months or even years earlier. Con Ed even took action . . . but it told no one.

Computerized networks and other users of Con Ed supplies are entitled to some information so they can bring their contigency plans into operation.

Nor were these the only affected terminal/network systems. Banking terminals and credit terminals were only some of the other public service systems that must have been affected. How did they react? How can they be improved?

Perhaps we need a power-cut emergency wire service like the one that passed the news of the American helicoper shot down in North Korea into New York television shows during the blackout. Computer sites could determine in advance whether to pay for such a signal as a precaution and then could make their contingency plans accordingly.

We certainly need something. If we take the opportunity to learn the lessons of the New York blackout of 1977, then we will be much more ready in 1980 to face power problems anywhere in the world.

Here's hoping. As usual, your suggestions as to suitable ways to get something done will be appreciated.

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# Hersey Argument Against DP Copyrights Exclusionary

**By Calvin N. Mooers**
Special to Computerworld

## Reader Commentary

In regard to *Computerworld*'s recent editorial [CW, July 11] on author John Hersey's dissenting view on copyrights for computer programs, [CW, July 4], the first question we must address is whether there should be legal protection for computer software.

Hersey and most others are in the affirmative, but he objects to the use of copyright. He proposes a new manner of protection in a draft "Computer Software Protection Act" complete with provisions for instituting legal suits for recovery of damages and for injunctive relief.

Hersey's legislative proposal is so close to copyright in its essentials that he appears to be urging a redundant statute. We don't need duplication of the laws.

Hersey believes allowing copyrights for computer software writings (programs) will somehow cause a "pollution" (his word) of other copyrighted writings of an artistic or literary kind. Software is different and polluting, according to his argument, because it can be used with or to control machines.

He holds that software in a computer is a "mechanical process" or actually a "machine." This is bad because, in his words, "a definite danger to the quality of life comes with a blurring and merging of human and mechanical communication." Also, "it goes to the distinction between human beings and machines."

Hersey therefore wishes to reserve copyrights for artistic works — arts, books and music. (He overlooks the possible polluting effects of the present widespread use of copyrights for commercial advertisèments, inflatable plastic Santa Clauses, junk jewelry, tables of math functions, etc.) He wishes to exclude from copyright writings which can be used with one particular mechanical device — the computer.

Cannot his exclusionary argument about mechanical pollution be applied to books which are prepared for publication by linotype or computer typesetter, rather than by hand with a quill pen?

Can't it also be applied to plays mechanically transmitted and presented by television? Or to art in the form of color photography?

What of ordinary typeset books which will soon be used to control reading machines for the blind?

Would Hersey forego copyright to one of his future novels merely becaue he composed it while using a desktop typewriter with an internal microcomputer with editing and correction facilities? What about books which will be published solely through the medium of a publicly accessible data base?

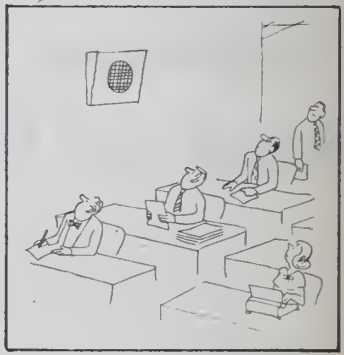
Only a little imagination is needed to show that Hersey's proposal, if acted upon, would create many future years of legal overlap, confusion and mischief.

Congress was quite clear as to its intent regarding computer programs during the legislation of the new copyright law. The committee reports of both the Senate and the House of Representatives said:

"With respect to the copyrightability of computer programs, the ownership of copyrights in them, the term of protection and the formal requirements of the remainder of the bill, the new statute would apply."

Amen.

*Mooers is with Rockford Research, Inc. in Cambridge, Mass.*



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## For Effective Software Management

# Structured Programming Valuable for Its Discipline

By Bruce E. Spiro
Of the CW Staff

There have been, as Gopal Kapur reminded us in "Conflict Over Structured Methodology Goes On . . ." [CW, June 6], many articles on the subject. A good number of these have come from the scholars and teachers associated with software development, as they properly should.

We should not overlook, however, the more practical aspects of the implementation of any form of discipline in the software development and maintenance area.

In our organization, with some 75 analysts/programmers, we implemented structured programming about a year and a half ago. We made an early decision *not* to evaluate different ways, but rather to go with what we understood the best.

Whether it was the particular articles, books and letters we had read or not, we quickly gravitated to the Harlan Mills approach. We have been most happy with the results.

The biggest differences we have noticed are a greatly increased visibility; much better user/analyst/programmer relationships and understanding; and a more comfortable feeling that we know what is going on. These are not quantifiable, we have no "before" and "after" figures about productivity, correctness, etc.

For us, this has not been an experiment to be evaluated; it has been a management action taken to correct problems perceived by management. We count it a successful one.

### First Real Discipline

No doubt there is long-range benefit in establishing the best methodology. More important to the practicing manager is the simple existence of discipline. As has been said, structured programming is not the absence of GOTOs; it is the presence of structure.

Whether it is chief programmer, Chapin charts, Hipo documentation or what have you, the structured methodology is the first real discipline that has come to our art. There are many confusing and often meaningless buzzwords, attracted by a not-too-well-defined process like software development. We need to look beyond this layer of smoke and put the effective and useful pieces to work for us.

As with all aspects of management, there is a highly personal element. What works for one individual or one group will not necessarily work for another. Theory X, Theory Y, Matrix and the others have been both successes and failures. We should know about them and then set up our own style that will work with our people and our environment, within the constraints that are known to exist.

So it is with structure in software development. It is essential that effective management proceed with what is useful without waiting for the ultimate answers.

Structured programming discipline can help. It will not cure all of the ills, nor will it be the last step to be taken. Like the systems we work on, management of software development is an evolving process that builds on past experience and must continue to take advantage of new and better ways to do things.

### Managerial, Not Technical

The first thing is the recognition that the use of structured discipline is more of a management problem than a technical one. In this regard, the specific techniques used are not the thing; the use of a discipline is.

The hidden meaning of generalized status reporting gives way to specific, definable points that are indicators of progress when they are a part of an overall discipline. For example, the successful test of a single module has little meaning by itself, but as a sequential element in a top-down structure it is as much an indication of progress as a yard maker on a football field.

The key point is that a complete discipline must be used. Structured coding — the presence or absence of GOTOs — may be intellectually satisfying, but will not be of significant value to timely, accurate cost-effective product delivery unless it is a part of a cradle-to-grave discipline.

Make no mistake, structured coding is a powerful technique and may well be the foundation upon which a disciplined approach can be built. But it is only a part. The most powerful engine will not even move a car if the gear box doesn't work. Even worse, without a steering wheel, it may be best if the car is not able to move at all.

The complete discipline must start with customer interface. Call it pidgin English if you will, but formal grammar combined with standard formats such as Hipo charts can be a significant element in obtaining user understanding of what the systems developer intends to do. It can therefore be an essential part of the early isolation of misconceptions and design errors.

It has been our experience that use of these techniques has significantly reduced the need for reprogramming immediately after implementation because "this is not what I wanted."

### Adding Detail

Using refinements, or a series of levels, of formal grammar, it is possible to add the detail needed for programming without destroying the initial meaning. This provides a program specification that accurately represents the mutually agreed-upon design.

The conventions of structured programming then supply the discipline that make a computer program a man-readable document. Properly executed, the listing produced reads like a book. No jumping from Page 37 to Page 9 for a couple of words in the middle of a sentence; no change in the meaning of a sentence by moving punctuation around or inserting different words.

We did not eliminate the GOTO; we found it is a useful device if it is clear why it is used and what purpose it serves.

In turn, the readability of the program makes the walk-through work. The problems sometimes attributed to the walk-through can be traced to the fact that the program itself can not be read easily by all of the participants.

When this happens, the basic problem of program readability must be solved before results can be expected from the walk-through.

## Reader Commentary

Top-down development really proves its worth in the testing process. Properly done, a top-down test provides a highly visible gauge of progress and an assurance that effective testing is being done.

"Properly done," is the key phrase. A sloppy structured program is no better than a sloppy unstructured program.

There is no guarantee of "goodness" in this or any other discipline, whether applied to computer software or not. The process of software development is a complex and difficult endeavor.

High-quality people are needed and knowledgeable management is essential. With these ingredients, a structured approach, well thought out and forcefully employed, can be of tremendous value.

The implementation of a structured discipline in a functionining software shop is not a simple thing. It should be undertaken with clear objectives, full management support and a high threshold of frustration.

There will be initial reluctance, and there will still be problems after the implementation is complete. First pass concepts and directions may have to be changed to fit individual circumstances.

Structured methodologies will not change the quality of the people; it takes good people to make any methodology work.

Structured discipline will, however, make the entire development process more visible to users, developers and managers. It will assist in the early isolation of design flaws. It will provide information for the recognition of schedule slippage at an early date.

In short, the discipline of the structured methods represent valuable tools and techniques that should be understood by all of us who are concerned with software development. They should be used as essential parts of responsible software management.

*Spiro is chief of ADPE Systems, Management and Requirements Office, in the Defense Communications Agency Operations Center, Washington, D.C.*

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# Letters to the Editor

## A Public Challenge to Rigo

Must Certificate in Data Processing (CDP) holders continue to be subjected to the verbal abuses of Joe Rigo taking a slight-of-hand slap at the certificate?

So what if Donn Parker got research monies to deal with programmers' ethics [CW, June 13]? At least he's dealing with the problem. He may not deal with it as others might, but one cannot for a minute diminish the value of Parker or his work to this industry.

So what if Jean Sammet felt the CDP was for others — or if, for that matter, the whole Association for Computing Machinery feels the CDP is for others? Did it ever occur to Rigo that they may defer because they are unable to pass the exam?

Only they know the answer to that question.

Now it's my turn. Parker and Sammet notwithstanding, I issue to Rigo a public challenge to take and pass the 1978 CDP exam — on me.

I will place on deposit with *Computerworld* a certified check for $100, payable to Rigo, and deliverable upon his showing evidence of satisfactory completion of all sections of the 1978 exam.

But wait, there's more. I shall also place on deposit with CW a second check in the same amount — this one payable to Institute for Certification of Computer Professionals (ICCP).

If Rigo is successful and I lose, ICCP will have my donation, specifically stipulated to defray the expenses of administering the exam to some worthy handicapped DPer.

But it's conditional. Rigo must deposit with CW a like sum, to be held in escrow for the same purpose should he not be successful.

If he is not successful, the price of his failure will be the $200, plus one brief article to be published by CW giving an honest evaluation of the exam and extolling its virtues.

If he is successful, perhaps he'll then have a different view.

Either way, it's time for Rigo to put his money where his pen is.

Kenniston W. Lord Jr.
Hudson, Mass.

## More on 'Audit Computers'

Frankly, I am stumped by the story in the July 11 issue entitled "Audit Computers Seen 'Freeing' Auditors in Future." The majority of the text deals with the usual DP horror stories that always come up whenever DP auditors get together.

Obviously, Donn Parker thought the concept of an "audit computer" would stir up some interest.

As a matter of fact, it did, and I would like to see a follow-up story which would cover the concept in greater detail.

Fred H. Francis
New Orleans, La.

## Comments on Degree Debate

In regard to Jack Stone's column in the July 4 issue, I most heartily agree with Regina Litman's comments concerning the college degree requirement of some organizations.

To me, the most unfortunate thing about this type of discrimination is not only the disservice done to the individual, but the disservice done by the hiring organization to itself and the industry.

Those DP types who work in organizations small enough to do their own recruiting and hiring know the dedicated, capable, enthusiastic trainee or professional is a rare person indeed. To me, it is inexcusable to refuse to consider such a person for lack of a piece of paper which may or may not mean anything.

Please do not let me give the impression that I do not believe a college education is valuable. Four years of education in the proper disciplines is of great value.

I also believe that years of successful experience in the real world can be of considerably more value than a diploma.

Cliff Fryda
Watertown, S.D.

## No Assembler in CCP Exam

The Institute for Certification of Computer Professionals (ICCP) is very appreciative of the coverage *Computerworld* gave of our panels at NCC. However, there was a serious error in "ICCPers See Tests Best for Self-Examination" [CW, June 27].

The second to last paragraph concerning the use of IBM's Assembler is exactly opposite of true. In spite of IBM's share of the market, the Certificate in Computer Programming (CCP) does not include IBM's Assembler language in those questions that have to do with low-level programming.

In fact, no specific vendor's assembler language is used in the CCP examinations.

Philip J. Gensler
Secretary
ICCP
Chicago, Ill.

what, me?
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WANG

## Programming Called Wasteful

# Most Runs Have Short Useful Life, Research Indicates

**By Don Leavitt**
Of the CW Staff

CHICAGO – Programmer productivity is a management issue more than a technical problem, and substantial amounts of programming within an installation, even using modern techniques, may be a waste of time.

In fact, management can do more by managing what is programmed, in the conventional sense, rather than managing how it is programmed, according to R.C. Kendall and E.C. Lamb of IBM's Information Systems DP Technical Planning staff here.

In a paper on Program Usage Studies distributed at the May meeting of Guide, the IBMers urged readers to reduce programming of low-usage programs, to reduce programming of short-lived programs and to use substitute methods instead of conventional programming.

Especially with respect to application programs, "install it first, program it last," they said. Most programs have a reason for being, so they should be produced, they said, but the reason is often so short-lived that a great deal of effort cannot be justified on the typical application program.

### Eight Test Sites

The initial study on which the paper was based was slated to last five months.

Data was gathered at eight test sites and much of it seemed to be just about what was expected; the top 10 and 20 programs in each of the shops accounted for very nearly the same amount of the total load.

When the researchers came back five months later, the percentages were just about the same, but 40% of the programs from the original lists were no longer in use. They had, effectively, died.

Two further extensions, each lasting four months, showed a comparable death rate for programs that had been among the most actively used ones when the first measure was taken. And a long-term study of a single site seemed to confirm the pattern, they said.

Ultimately, Kendall and Lamb documented what they called the churning and instability of the typical installation. There is, they saw, a high rate of development and a high "infant mortality" among programs.

An installation's program load typically has a death rate of 7% a month and the average program has a life expectancy of 14 months, they concluded.

More than that, the team found that most CPU load comes from a few programs which run frequently, but most programs do not have any effect on the load. The efficiency of application programs is clearly not a factor in total load, they added, and tuning such programs is "generally a waste of resources."

Programs typically are small, with only 4% having greater than 2,000 lines of source code and 50% having fewer than 400 lines of code.

The small size had some very definite implications in design approach and programming management, they warned. How, for example, can improved programming technologies, design reviews, code inspections and the like be applied to numerous small programs?

The small size also leads to "unitized functions" with embedded data descriptions and dependencies, they said, adding that characteristically that meant change was difficult – and dropping a program altogether might be more sensible than trying to fix it as conditions change.

Since the match of programming language to problem is "random" at best, the power of a high-level language vs. Assembler typically slips to "somewhat better than 2 to 1," rather than the usually expected figures of anywhere from 4 to 10 to 1, they added.

Just as clearly, RPG-like languages, data retrieval and inquiry facilities that can get a problem solved quickly – regardless of how efficient the solution might be technically – got tacit endorsements from the two researchers.

# 'Iris' Update Backs Reorganization, Use Of Nova Partitions

IRVINE, Calif. – The Interactive Real-Time Information System (Iris) software for Data General Corp. Novas and Nova-type minicomputers has been enhanced by Educational Data Systems, Inc. (EDSI). Iris 7.2 allows the user to set the size and number of partitions to be allocated, a spokeswoman noted.

There is nothing in the operating system to limit the number of partitions or the number of terminals that can be used, she claimed. Total memory size would be a limiting factor on the number of partitions; the type of multiplexer, the key to the number of terminals that could be supported, she explained.

The software allows a number of terminals handling the same task to access the same file. Provision is also made to support dynamic scheduling of low-priority tasks to ensure that all users receive service within a specified time interval, she added.

Iris has been redesigned for easier updating, she said. All Basic programs under the 7.2 version are position-independent, permitting the user to make system changes without having to dump the system onto a mag tape or disk.

The Iris supervisor requires 16K and the system can be used with minicomputers having 64K to 128K of main memory.

Iris costs $2,800 in single units, but requires a business Basic system from EDSI – for another $800 – to be immediately useable. Other software for "Asgol," edit routines and Assembler-level coding are also available, the company said from 1682 Langley Ave., Irvine, Calif. 92714.

# 'Poor Man's TSO' Has Features Of IBM Software at Lower Cost

PORTLAND, Ore. – OTS from JLB Systems is sometimes referred to as a "poor man's TSO," according to a user, because it supports many of the facilities of IBM's Time Sharing Option, but with much lower system resource requirements.

Operationally, OTS is a multitasking extension of IBM's Operating System which uses common teleprocessing techniques to achieve good response time and efficient computer utilization, a vendor spokesman claimed.

Its purpose is to increase the productivity of the application programming staff, the systems programmers and the operations control function. It is even used occasionally by non-DP people for data entry, he noted.

The software provides a full screen editing, internal reader job submission, data set and catalog management and print file viewing. It also backs a limited command language, dynamic data set allocation and operator communication, he said.

It is, according to the spokesman, an efficient and comprehensive program development tool that allows "in context" editing of source programs, JCL manuals and documentation using local or remote 3270 terminals and operating under OS and VS systems.

The efficiency is such that the software can function with a minimum of 55K whereas IBM's TSO requires "something like 200K." OTS also functions with 3% to 5% fewer CPU cycles than TSO, he said.

Increased productivity is achieved through faster test turnaround, higher quality maintenance and just plain better control over programs and documentation, he added.

The system includes an interface to The Librarian from Applied Data Research, Inc. and this linkage apparently could be extended to other library systems.

OTS can be acquired for a one-time cost of $5,000 or $250/mo from the vendor at 3930 S.W. Kanan, Portland, Ore. 97221.

# Billing System Set to Monitor PDP-11s Running Under RSTS/E

BOSTON – A job accounting and billing system for the Digital Equipment Corp. PDP-11 under version 6A or 6B of the RSTS/E operating system is now available from Mark/Ops.

The system is based on "snapshots" it takes of users who are attached, on-line to the minicomputer. The package collects such data as collect time, CPU time, language in use, program name in use, peripherals assigned to a job, job number and keyboard number, according to the vendor.

An additional feature is a Mark/Ops modification of the DEC-supplied "LOGIN" utility. This allows the user a session identifier which appears chronologically and as a subtotal on a monthly bill, the spokesman noted.

The billing system also collects storage use, by day, and reports it. Beyond that, there is a facility to use all the data collected for a range of management reports keyed to system utilization, he said.

The billing data is taken at six-minute intervals and reduced at the end of the day. A rate structure varying with time of day and day of the week is possible, the company added.

Users appear to be protected against bad billing with this system. A recovery procedure "assures" billing data capture even after a system crash. Systems in which crashes occurred are captured and flagged on the user bills, the spokesman noted.

The package cost depends on whether the user is commercial or educational and on the number of copies ordered, Mark/-Ops said from 475 Commonwealth Ave., Boston, Mass. 02115.

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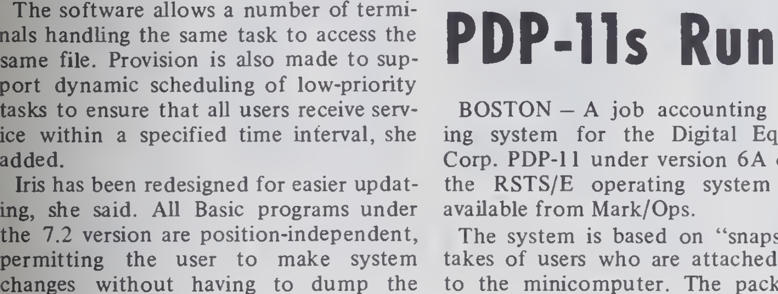

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# Data Administrator Encompasses Functions of DBA

**By Stephen L. Robinson**
Special to Computerworld

**Data Base Corner**

Much has been written about the management of data base systems. The sources of such literature span the spectrum from business school academics to system programmers, from managers of management information systems to DP directors, from vice-presidents to analysts.

Out of all this frequently contradictory literature, we shall endeavor to distill an essence of sanity.

As with any subject, tracking the evolution of today's terminology may be useful in clarifying the problem. The development of a data base system requires not only a recognition of the true nature and scope of the objective system, but the creation of a team of management and technical personnel to plan and monitor the transition process.

In the early days (four or more years ago) of data base, it was fashionable to talk about a single individual, usually called a data base administrator (DBA), who would control the entire effort. The DBA concept was not only implemented in many organizations, it was preached by virtually all of the active data base consultants and lecturers (yours truly among the group).

This "oberfuhrer" system got a real workout in the cold, hard business world. After several years of field trials, the concept was found wanting. Too few supermen/superwomen could be found who could juggle a complete data base system environment.

Indeed, there seems to be a question whether one person, no matter how super, can manage all of the activities.

The original concept of data base administration spanned technical and executive skill areas; tactical and strategic planning, computer and noncomputer problems. Many DBAs, recognizing the problems they faced, were instrumental in creating a position of assistant DBA within their own data base adminstration group.

The DBA retained the executive and strategic responsibilities for the data base system while the assistant DBA absorbed the tactical and technical responsibilties. This division follows rather closely a distinction, suggested several years ago, between a data administrator and a data base administrator.

Terminology being what it is, the mapping is as confusing as possible; the term "data administrator" corresponds to the executive and srategic aspects of the old DBA designation, while the term "data base administrator" corresponds to the technical and tactical aspects of the old DBA designation.

Since data base systems are an evolving phenomena, the management of such systems is still changing. As more organizations try different management structures, we will learn more about how a data base system can best be managed.

In the interim, we present the following thumbnail sketches of data base administrator and data administrator. In future "Data Base Corners" we will discuss major tasks of these two offices in greater detail.

### Data Base Administrator

The DBA is responsible for the physical well being of that part of the data base which is stored on a computer. The DBA therefore possess the combined skills of a system/programmer/analyst and a computer analyst.

He should ideally have had a major role in the selection of a data base package, teleprocessing package and a data dictionary package. (It is recognized that in many organizations some of the aforementioned selections would fall under the aegis of an existing systems group.)

The DBA, in conjuntion with computer center management, will establish the configuration for data base processing (e.g. for batch, message, etc.). The DBA staff will be responsible for the security and integrity of the data base and the data base package.

The DBA group designs both schemas and subschemas (physical and logical data bases) and serves as consultant to application programmers and analysts on the proper use of the data base system.

In summary, this is a technical office, devoted to the day-by-day aspects of the data base operation as well as the planning for technical expansion and enchancement. This group has minimal involvement with end users.

### Data Administration

Data is a corporate resource. It is expensive to gather, maintain, organize and use.

Heretofore most organizations have derived minimal return from their investment in data. As noted in earlier articles, this is primarily due to the file system philosophy of data organization.

Under this philosophy data elements "belong" to an application rather than possessing, as an attribute, those applications which require it.

The data administration group is responsible for inverting the sense of present file systems and creating a true data base system. The major tasks of data administration are:

- Documenting and analyzing existing data systems.
- Assessing data and information requirements.
- Developing a model of the organization's data.
- Planning for the sharing of data.
- Developing new data entry procedures, forms, etc.
- Working with "users" who require information.

Note that data administration involves many noncomputer-related aspects of DP. This group should not be confused with a management information system group, which is primarily concerned with using the data base to develop models and reports for the benefit of management decision making.

Clearly these have been only brief outlines of the two functions to merely identify the characteristics of the areas. In future columns we will address each area in some detail.

The intent of the forthcoming columns will not be to set down absolute job descriptions, but to present the state of evolution in various organizations.

*Copyright Stephen L. Robinson, 1977. Letters related to data base concepts or techniques can be addressed to Robinson at CACI-Commercial, 75 Rockefeller Plaza, New York, N.Y. 10019.*

## Lecht to Speak in L.A.

CHICAGO — Charles P. Lecht, author of *The Waves of Change*, will be the keynote speaker at a two-day conference for DP trainers sponsored by Advanced Systems, Inc. (ASI) in late September at the Marriott Hotel here.

Workshops covering a range of subjects will also be part of the program, a spokesman noted.

For those registering in advance of the Sept. 26-27 meeting, the cost is $80, but registrations at the conference itself (for $95), "are also welcome," he said from ASI offices at 1601 Tonne Road, Elk Grove Village, Ill. 60007.

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## Syncsort vs. 5740 Release 3

# User Picks Independent Sort Based on IBM-Run Tests

By Don Leavitt
Of the CW Staff

SALEM, Ore. – Benchmarking a software product – actually running it to see how well it does against expectations or against the performance of a functionally comparable product – has long been recognized as one of the better screening techniques. And lately a number of installations around the country have been using benchmarks to assess different sort systems.

The choices differ depending on the user's system and needs, but large-scale IBM shops now have a choice that includes at least IBM's older sorts, its latest – Release 3 of the 5740-SM1 product – and Whitlow Computer's Syncsort.

There have been reports of a number of Release 3-Syncsort confrontations ever since the IBM product was introduced earlier this year [CW, April 11]. One of the most unusual of these exercises was run here at the Oregon Department of Transportation data center in May.

The details of the test results were substantial enough so that the department's software specialist, Dewayne Theissen, sent them along to management when he requested permission to purchase Syncsort. But the results were not the high point of the tests, in his view; the way the tests were run was equally significant to Theissen.

He laughed when he was asked whether it was someone from his organization or from Whitlow that had run the tests. "Neither," he said, "it was our IBM system engineer [SE] . . . Now there's an objective source for an evaluation."

### Representative Mix

The tests took place largely because the department had reached a point where it felt it needed a better sort than it had. Six different state agencies use the department's 370/158 with 3M bytes of memory, running under OS/VS.

The SE was asked to run tests comparing Syncsort – which Theissen and others had read about – with the sort then in use. The results were very favorable to the Whitlow product, but then Theissen heard about the updated version of IBM's 5740 sort, and he felt he had to give it a try.

So he asked the IBM technician to run parallel sorts using Syncsort and the 5740 Release 3.

The sorts were a representative mix of the department's workload, he said. There were about 16 different files to be sorted and the SE set them up in different ways, at different times of the day and on different days of the week to be sure neither package had an advantage by accident of when it was run.

Generally working with a 128K sort region, the SE set up short, mid-range and long sort tasks. Most of the records were fixed-length format, although variable records were also in some of the tests.

Some of the records were 30 bytes long; others had 2,000 or more bytes. And volumes were equally diverse. Some of the jobs involved only 3,000 to 4,000 records; others ranged up to 3 million to 4 million, Theissen said.

### 'Tremendous' Improvement

Even though he had no specific data on what improvement the Whitlow sort provided, even compared with IBM's Release 3, the department's spokesman characterized the improvement as "just tremendous" and leading to cutbacks in both wall clock time and CPU time.

The comparative stability of the product also impressed Theissen. He said the IBM SE couldn't use the Release 3 package he brought with him for the tests. It wouldn't run until he made several "fixes" to the basic coding.

Theissen was also impressed with the way Syncsort compensated for "trivial" operator errors – a slight mistake in the job control statements, for example – and kept going, whereas "Release 3 just plain bombed" when faced with the same flaws.

Release 3 proved a vast improvement over the department's earlier sort, Theissen said. The IBM update beat Syncsort twice, he recalled, but Syncsort topped the performance of the IBM release 13 times.

"When you got right down to it, almost regardless of what the SE did to get Release 3 in a good light, Syncsort outperformed it." And the IBMer admitted it after a while, Theissen said.

# Metro Access Grows On GE Mark III Net

ROCKVILLE, Md. – General Electric (GE) has expanded the Metro Access capability of its Mark III remote computing network both geographically and in services available.

For the past year, Metro Access services have been available in New York, Chicago, Los Angeles, Cleveland and Washington, D.C. As of July 1, the services became available in Boston, Atlanta, Dallas, Schenectady, N.Y. and San Francisco.

Previously, Metro Access supported 1,200 bit/sec full-duplex service, 4,800 bit/sec service and GE's telephone information processing service based on input from tone-type telephones, all linked into Mark III data centers.

The services have been expanded to also support 110- and 300 bit/sec service, a recently introduced data entry mode service and 2,400 bit/sec service in each of the 10 metropolitan areas now covered.

Headquarters for the Mark III network is at 401 N. Washington, Rockville, Md. 20850.

# Pansophic Cuts Prices

OAK BROOK, Ill. – Pansophic Systems, Inc. has slashed the prices of its software products for installations using low-order IBM 360 and 370 CPUs.

This policy brings Panvalet, for example, down to $2,980 instead of the full cost of $4,980, a spokesman noted.

Pansophic is at 709 Enterprise Drive, Oak Brook, Ill. 60521.

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# Ketron Selling MPS III For Linear Programming

ARLINGTON, Va. — MPS III, a mathematical programming system designed for use with applications involving large or complex linear programming (LP) models and associated data bases, is now available from Ketron, Inc.

Previously supported by Management Science Systems, Inc., the software is packaged for in-house use on large-scale IBM or Amdahl CPUs and is available as a service on various remote computing networks, including General Electric's Mark III, National CSS and McDonnell Douglas Automation facilities, according to a spokesman.

The basic system includes control and standard LP optimizer capabilities. Options include Dataform, a data management subsystem developed specifically for management science problems. It supports matrix generation, solution analysis and report writing.

Other options include Whizard, which solves LP models entirely within main or virtual storage; GUB, a generalized upper bounding facility that solves certain classes of LP models; and Lockbox, a facility location optimizer, the spokesman said.

Another option, Mistic, is said to solve mixed-integer models while Quad resolves quadratic problems.

Written in BAL, the basic system is available under a paid-up license for $6,000. Dataform costs an additional $24,000; Whizard, $13,500; GUB, $22,000; and Mistic, $6,000.

Monthly leases are also available, Ketron noted from the 12th floor of the Architect Building, 1400 Wilson Blvd., Arlington, Va. 22209.

# ISE Sets Meet

SAN FRANCISCO — The first national conference of the Institute for Software Engineering (ISE) will be held Aug. 10-12 at the Del Webb Towne House here, according to the meeting's general chairman, Ed Prichard.

The conference program will range from reports of "very specific achievements" in capacity management using software physics to more general presentations exploring various aspects of software engineering, Prichard said.

Although the conference is geared to the interests of institute organizations and most of the papers will come from these groups, the meeting is open to anyone interested in the general subject area and the program will include a number of papers from nonmembers, Prichard noted.

Registration fees — $85 for ISE members and $135 for others — cover session attendance, a copy of the conference record and a ticket to the conference luncheon.

Other information is available from Don Madden at the institute, P.O. Box 637, Palo Alto, Calif. 94302.

# 'X2C' Features Enhanced

FAIRFIELD, N.J. — Capabilities added to X2C, the data management system on the Rapidata, Inc. remote computing network, enable users to create complex structured data bases through "simple, English-language" instructions, according to the vendor.

The modifications provide users with more direct access to DBMS-10, the data base management system running on the firm's Decsystem-10s. The standard X2C syntax defines all data relationships required to set up a Codasyl-type hierarchical or network data base, a spokeswoman noted.

Updating and data maintenance capabilities, also added to X2C, make it possible to interactively add or modify information in an existing data base, she added. If large numbers of updates are to be done, however, they can now be batched.

String manipulation functions — another range of enhancements — include facilities for concatenating and dissecting strings, pattern matching, character location, justification, blank-trimming and character set replacement.

Rapidata expects these functions to be used for interactive command parsing and easier selective data retrieval, she explained.

Charges for using X2C are based on the network's standard resource usage costs. Off-peak or batch processing can be used to cut updating and report costs, she said from Rapidata's offices at 20 New Dutch Lane, Fairfield, N.J. 07006.

# SDS Adds Data Bases

SANTA MONICA, Calif. — Two data bases have been added to those already available through the computerized retrieval service offered by System Development Corp. (SDC), adding access to almost 50,000 recently published articles, journals and books on business and management.

Users working with their own terminals can reach the data bases, called Accountants Index and Management Contents, by local dial-up phone connection to the SDC center, a spokeswoman noted.

Compiled by the American Institute of Certified Public Accountants, the Accountants Index includes material published since January 1976 and covers such areas as accounting, auditing, data processing, financial reporting, taxation and investments, she said.

Management Contents, produced by Management Information Services, provides access to articles published since September 1974.

The company is at 2500 Colorado Ave., Santa Monica, Calif. 90406.

# Composer Linkage Grows

PLAINVIEW, N.Y. — Software is now available for the Varicomposer I to permit its use with Linofilm Europa and Domestic ACM-9000 as well as other phototypesetters, according to Varisystems Corp.

The composing and editing system, built around Varisystems' own 32K minicomputer, can perform four different functions simultaneously including disk I/O, hyphenation, justification and editing and, "if required," hardcopy printout, a spokesman said.

Using software to interface with various systems eliminates keyboard changes. The "soft" approach also supports forward and backward scrolling through the floppy disk-based file to check or change copy before it reaches the phototypesetter, he said.

Data on the Varicomposer I and the new Linofilm and ACM-9000 programs is available from Shefra Graphics Ltd., AG Slough, England, or from the Marketing Department, Varisystems Corp., 80 Skyline Drive, Plainview, N.Y. 11803.

# Deltak Course Trains Trainers

SCHILLER PARK, Ill. — Designed for individuals at DP installations who will be responsible for guiding others taking Deltak courses, "Learning Reinforcement: Tutoring" is a two-part multimedia course that requires two and a half to three hours of study.

Concepts in this particular course have some value for those dealing with materials from other audiovisual vendors, but it is primarily keyed to approaches described in guides to Deltak's own subject matter courses.

"Learning Reinforcement: Tutoring" is available through the company's Resource 12 library rental program or can be purchased separately, Deltak noted from 9950 West Lawrence Ave., Schiller Park, Ill. 60176.

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## A Distributed Processing Necessity

# Source Data Entry Pushing Terminals Into Mainstream

**By Stephen Robinson**
Special to Computerworld

The evolution toward distributed data processing (DDP) is resulting in greater integration of the terminal business into the mainstream of the DP industry. That integration is based on a single fundamental concept — source data entry (SDE).

DDP is based on the concept of establishing processing elements of an appropriate size at the best locations for any particular organization. SDE simply implies providing user-oriented input/output elements to the people within an organization who create the data to be processed.

The benefits of SDE are derived from the opportunity it provides to create a "dialogue" betwen the element (in this case, a terminal) doing the machine encoding and the person who created, and therefore understands, the data being collected.

For each added step between the creator of the data and its encoding, the error rate increases and the cost of detecting and correcting the errors rises proportionately. Avoiding these errors and costs has driven users first from traditional data entry methods such as the keypunch and later from key-to-disk media devices (tape, disk, diskette, cassette), where the entry of data is separated physically from both the source and the computer, toward greater use of SDE techniques.

### Key to Success

The key to success in implementing SDE systems lies in the ease with which the operator, with minimal training, can interact with the terminal.

Two basic principles govern any SDE situation. The source (operator) must be able to confirm that the terminal correctly encoded and labeled the data entered. The terminal must ensure that the data was entered in proper form by executing a series of tests for the type of data expected.

Any errors detected can be corrected immediately because the creator of the data — the operator — is present. Those familiar with the situation in which data is received from a source — for instance, a person on the telephone — and then encoded in a separate step will recognize the importance of this seemingly simple improvement.

These principles must be implemented in a way that conforms conveniently to the user's way of doing business and enhances his efficiency. The system must be flexible enough to adapt to the user's specific requirements — not the other way around.

Operator/terminal interaction usually comes under the control of programmers in a DDP environment. User organizations ultimately determine the quality of this interaction either by selecting vendor-provided features or by creating additional controls (access methods, formats, procedures and checks) that are tailored to the particular data being collected.

In the marketplace this has led to demand for systems with more local programming and communications capabilities — in other words, intelligent terminals and specialized software.

### Range of Options

Many vendors currently are moving to provide distributed systems terminals. These include:

- Intelligent terminal vendors.
- Key-to-disk (-tape, -cassette, -diskette) manufacturers.
- Interactive terminal vendors.
- Minicomputer manufacturers.
- Batch-oriented remote job entry.
- System houses.
- Mainframe manufacturers.

The problem for the user is to select a vendor whose products and expertise best match those required for his particular implementation scheme and one that offers flexibility for tailoring to his applications.

In the last decade, industry- or application-specific terminals were designed for very specialized uses. This specialization forced both the user and the vendor to amortize the development costs over a limited number of units.

Recent years have seen a move to microprocessor-based terminals in which most customization can be accomplished via the microprocessor software. Such terminals are significantly more flexible and adaptable.

However, changes in their function still require either vendor assistance or sophisticated users with staffs capable of microprogramming. Other drawbacks with microprogramming are the lack of higher level languages and the limited power of the microprocessor.

The minicomputer-based terminal, on the other hand, can be adapted for use in specific industries, such as airlines, banks, manufacturing and hospitals, with software written in Cobol, Fortran or other standard languages. This type of terminal is very flexible, since it can run a variety of programs concurrently and can also be used as a general minicomputer to process local applications.

DP departments are showing increasing concern for the effectiveness of their solutions as they begin to implement systems that interact directly with higher levels of their management. These departments no longer enjoy the old security blanket of being the exclusive link between their computers and top management.

With greater dependence on terminals by persons who are not DP specialists, reliability and ease of use become more critical. Lack of these qualities is magnified in situations where the users are highly visible to their own customers — nurses, bank tellers, manufacturers' or distributors' representatives or clerks at checkout counters, for example.

SDE also provides a ready solution to the administrative problems of today's "consumer revolution" because terminals permit data entry while the data source (the consumer) remains available, in person or on the telephone, for corrections during the process.

The emphasis will not remain on the technological differences between various products used to collect data. The 1980s will see even greater movement toward market-driven products where functionality and flexibility will be of prime importance.

And data entry will be seen not as an adjunct to the DP arena, but as a key element of it.

*Robinson is manager for market planning/-terminals, Honeywell Information Systems, Inc.*

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## For T/S Applications

# HP Unveils Four-Color, Compact Graphics Plotter

PALO ALTO, Calif. — Hewlett-Packard Co. has introduced a four-color, portable graphic plotter for use in time-sharing applications.

The Model 7221A features RS-232C compatibility and plugs into a terminal. The plotter bed is 11- by 17 in.

HP 7221A Four-Color Plotter

A microprocessor that is also used in the HP 9825 calculator drives the stepper motor and optimizes the use of communications, according to the firm.

The unit has a built-in buffer memory of 1,150 characters expandable to 3,086; internal alphanumeric character, arc and circle generation: and user-defined dashed line patterns.

Up to 64 macro instructions can be stored at one time, the firm said.

Like the company's Model 9872 plotter, the 7221A selects the appropriate pen from a bank rather than carrying them on the arm.

Transmission rate is switch-selectable from 75 to 2,400 bit/sec. The 7221A features parity control and half- or full-duplex mode.

The unit can be operated in local mode, writing characters typed on the terminal keyboard. Upper and lower case printing is available.

### Self-Test Diagnostics

The 7221A has a self-test feature which runs diagnostics without the aid of a computer and which pinpoints the fault in over 90% of instances, enabling a user to tell HP what part is needed, a spokesman claimed.

The test feature takes about 500 words out of the micro's 6K operating system, he said.

The internal character generator contains six fonts and the 2.5mm-character plotting speed is typically 3 char./sec, according to the firm.

A single command defines a circle in either direction and angles of rotation can be specified to up to .06 degrees resolution. Plot resolution is programmable to .025mm, according to the firm.

The stepping motor is controlled to .008mm at full pen speed of 36 cm/sec, the spokesman added.

### Software Library

A library of 80 Fortran subroutines is available for HP 1000 and 3000 series computers, of which 52 are acessible to users. About five of these are similar to those used with incremental plotters, the spokesman said. The HP Plot 21 package sells for $50.

The library is also available on the General Electric Mark III time-sharing network and will be available on others also, HP said.

The plotter costs $4,600; it is priced at $4,825 with an expanded data buffer. The unit is manufactured by the San Diego Division, a member of HP's Instrument Group.

Delivery will start in August, HP said from 1507 Page Mill Road, Palo Alto, Calif. 94304.

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## Terminal Transactions

# Distributed System Relieves Tellers' Writing Burden

READING, Pa. — Tellers at the Conrail/Amtrak Federal Credit Union have written neither checks nor receipts since the installation early this year of a distributed DP system that utilizes communications printing terminals.

The system links Conrail's main office here and a branch in Philadelphia with dual IBM 370/168s at the central data center in King of Prussia. It is leased and serviced by Comteck, Inc., a subsidiary of Shared Medical Systems.

Conrail/Amtrak's system is a far cry from the batch processing system they used previously. Until the installation of the present system early this year, tellers would bundle the day's paperwork and ship it to King of Prussia, where Comteck would process it that night.

"Not only is this a thing of the past, but we can now key in a loan in Reading and have it displayed on a CRT or printed by a printer terminal in our Philadelphia branch office," according to Conrail/Amtrak's assistant treasurer, Hiester Haeseler.

"It was a big step for us. From a manual operation where every check and receipt was typed by hand, we've gone to one where the teller enters a transaction, pushes a single key and the check is imprinted automatically," Haeseler said.

The Comteck credit union system is a distributed DP service which involves the shared use of the duplexed 370/168s and either in-house or shared use of Digital Equipment Corp. PDP-11/70s used as transaction processing systems.

The DEC machines have 256K bytes of memory and disks containing 88M bytes of additional memory. The 11/70s communicate through DEC PDP-11/34s under a binary synchronous protocol through dedicated leased lines to the 370 CPUs.

Conrail/Amtrak and other credit unions tie into the DEC minicomputers located in-house or regional centers operated by Comteck.

A total of six Perkin-Elmer Data Systems Carousel 350 printing terminals located at the center here and in Philadelphia communicate asynchronously to the distributed minicomputers at 1,200 bit/sec over dedicated lines through modems assembled by Shared Medical Systems.

The imprinting of checks as well as receipts for credit union members is performed on the 350 terminals. In addition, loans can also be displayed on Beehive Medical Electronics, Inc. B100 CRTs, located at the other office, Haeseler said.

Because the printer has a split platen, checks fed on a continuous roll can be imprinted on one side while receipts are fed into the other.

To do the same job as fast without the split-platen printer terminal, Conrail would need two printers in each office, Haeseler said.

A model 310 Carousel is also used by the credit union for back-office work where documents are not required, he added.

### First on System

The Conrail/Amtrak Federal Credit Union is reportedly the first credit union to go on this distributed system.

These systems are a response to both the recent growth of credit unions as an alternative to conventional banking operations and to the unique needs of credit unions, according to Bill Guiney, manager of systems and operations at Comteck.

"Credit unions handle a much greater amount of back-office work than either banks or savings and loan associations," Guiney said.

"Because the credit union's customers are typically the employees of one company, there is a heavy emphasis on payroll deductions and a substantially lower volume of cash transactions. This tends to increase the credit union's reliance on various forms to handle transactions," he explained.

In the Comteck credit union sytsem, terminals remove most of the burden of forms handling from the teller.

Comteck chose the Carousel because of its unique forms handling features. "No other terminal that we've seen has both a split platen and acceptable print quality."

### Quick-Change Platen

Another Carousel 350 feature that Guiney regards as a plus is its quick-change platen. In less than a minute at the close of the business day, the split platen can be removed and replaced by a solid platen that feeds full-width, standard fan-fold paper for printing a variety of reports.

Larger credit unions would find it advantageous to have exclusive use of an on-premise transaction processor, Guiney noted. For one thing, the on-site mini gives them greater control over scheduling — to decide whether to print reports or to go on a transaction-by-transaction basis.

An in-house mini also cuts down dependence on the network staying up since the mini can operate independently of the host for long periods of time.

Finally, the in-house mini cuts down phone-line expense since communication with the host can be done with a single dedicated line, Guiney said.

In the case of local firms such as Conrail/-Amtrak, the PDP-11 is located at the same site as the central computer in King of Prussia.

### Distributed Approach

Even so, Guiney said the distributed approach is an advantage. The IBM computer, he noted, is at its best when processing batch jobs. It can be very unresponsive to the real-time needs of many customers.

From Conrail's viewpoint, there are other advantages in using the distributed approach to processing.

For example, applications such as programming and operation scheduling were customized to their own needs. Conrail is also now able to do exactly what it wants when it wants, such as reporting and batch jobs on one minicomputer and real-time updating on another.

There was also a benefit in the speed and accuracy of check and receipt printing, the Conrail officials said.

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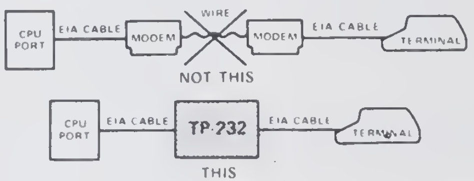

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# DP Dialogue

Notes and observations from IBM that may prove of interest to data processing professionals.

*Honeycomb-like storage cells of the IBM 3850 Mass Storage System. The MSS can put as much as 472 billion characters of data online to the computer.*

## 3850 Simplifies Life at Dun & Bradstreet

"Our business is information," says Dun & Bradstreet's vice president, Gordon J. Aubrecht. "Every day, some 2,000 people—trained business analysts—gather that data through direct interviews with business owners. It is then our job to store, assemble, package, and disseminate it. Computers make that possible. And computerized verification and security programs help us monitor accuracy of the information while safeguarding confidentiality of the file."

The wellspring of its credit and marketing services to the business community is Dun & Bradstreet's data base on four million commercial enterprises. So the company is assured prompt access to any part of this file, D&B has chosen to use an IBM 3850 Mass Storage System (MSS), designed for the online storage of large quantities of data.

"The MSS gives us the benefits of high-speed disk storage, but at the cost of tape," Aubrecht says. "Since installation in our New York computer center, we have been able to cut back from 22 tape drives to eight, and have reduced our tape library from 22,000 reels to 16,000. And we expect that number to diminish to 8,000 before long." The center is equipped with two System/370 Model 158s.

"This file base is the foundation for many of our services," Aubrecht notes. "We computer-typeset—directly from the stored information—such publications as the Dun & Bradstreet Reference Book, The Apparel Trades Book and the Reference Book of Manufacturers. From the same file, we extract detailed, custom-tailored marketing facts, called Dun's Market Identifiers."

Adds Robert Porowski, director of computer operations and support: "The most important gain for us was the elimination of manual handling of tape. We've done away with thousands of mount/dismount operations each month and, at 2½ to 3 minutes per operation, that's hundreds of hours saved."

In the IBM 3850 Mass Storage System, data is recorded on magnetic tape enclosed in small cartridges, which are automatically retrieved by the system when required for read or write operations.

"The shift to MSS, along with other changes made at the same time, also yielded some direct hardware cost savings," Porowski added. "It's a new mode of storage, occupying a new place beside disk and tape in terms of cost and operating characteristics. By using it for the storage functions to which it lends itself—in our case, the equivalent of multiple data bases online—we're achieving important gains in performance and quality, significant cost savings and a real assist in internal operations."

## Nashville Steps up Programmer Power

When the city of Nashville, Tennessee, adopted extended-area government, a metropolitan area of a half-million people was unified under one administration. One resulting efficiency is data processing service provided to the entire metro area—known formally as the Metropolitan Government of Nashville and Davidson County—from one computer center with an IBM System/370 Model 158. To increase productivity, the center uses three new aids to develop and maintain application systems.

One aid, called Hierarchy plus Input, Process, Output (HIPO), approaches program design and documentation in terms of small, functionally defined modules. Another, Structured Programming, makes programs easier to read and understand.

The third aid is Data Language/1 (DL/I), an IBM data base manager. DL/I structures data into a common format that allows many programs to access the same files, eliminating redundancies.

All three can reinforce each other to make application development and maintenance more productive.

How much more productive? Ron Dickie, director of data processing and computer services for Nashville, points out that, along with quantifiable improvements, many of the important benefits are intangible, such as improved forecasts of development times and costs.

Precise gains include a doubling of workload without an increase in staff size and using 20% to 40% less computer time to test new applications. And new programmers can write online programs after only two months of training.

"On that quantifiable basis, we identified $173,350 of costs actually avoided during the first year with the new techniques," says Mr. Dickie. "That's particularly impressive to us because it was a busy year, in which we developed seven major application systems."

Because program development now is done in a modular fashion, a programmer needs only one week, on the average, for coding and testing a program.

And program maintenance activity was greatly reduced under DL/I. "We used to spend a lot of time in rework," says Mr. Dickie. "Now we alter data bases and switch storage devices without making program changes.

"All in all, HIPO and DL/I and Structured Programming have proved to be a winning combination. They've helped us serve our citizens better while saving some hard-earned taxpayers' dollars."

*DP Dialogue is designed to provide you with useful information about data processing applications, concepts and techniques. For more information about IBM products or services, contact your local IBM branch office, or write Editor, DP Dialogue, IBM Data Processing Division, White Plains, N.Y. 10604.*

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## Terminal Transactions

# Olivetti Brings Out 8-Bit Teleprinter Available in RO, KSR and ASR Versions

NEW YORK — Olivetti Corp. has introduced an 8-bit teleprinter that is available in three versions — receive-only (RO), keyboard send/receive (KSR) and automatic send/receive (ASR).

The basic Olivetti TC 480 for sending and receiving messages can be upgraded with optional I/O units and memory to an interactive terminal for on- and off-line data collection, time-sharing, batch communications, limited text editing and word processing, according to the firm.

The basic terminal is equipped with a standard TTL serial interface for local connections. For communications, it can be optionally equipped with a variety of interfaces including RS-232 and current loop, which allow communications at four operator-selectable speeds from 75- to 1,200 bit/sec, Olivetti said.

In the optional communications mode, the teleprinter communicates asynchronously in Ascii code in a 10- or 11-unit character structure, the firm added.

The TC 480 keyboard generates the 128-character Ascii set. An optional numeric pad is available to facilitate numeric data entry as well as dialing remote terminals over switched lines, it noted.

The device prints 7 by 9 dot-matrix characters at speeds up to 30 char./sec, Olivetti said, adding up to 132 char./line and up to 64 characters can be stored in memory when the terminal is in receive mode.

A horizontal and vertical tab option stores seven tabulation programs in erasable programmable read-only memory (Eprom).

In addition, one priority program resident in optional random-access memory (RAM) can be stored through the keyboard, from the line or from the optional I/O units, the company noted.

Optional I/O units include an 8-channel tape reader and combined reader/punch, an integrated double magnetic cassette unit with storage of 160K bytes, a built-in minidiskette with an 8K-byte capacity for text editing and an 8K byte RAM for additional editing.

The TC 481 receive-only (RO) terminal is priced at $1,625. The TC 485 KSR costs $1,750.

The tape reader/punch costs $800. The cassette unit can be added for $1,200, the minidiskette for $1,050 and the additional 8K RAM for $900, according to a spokesman, who added the options can be factory or field installed.

RS-232 or 20mA current-loop interfaces cost $100 and $120 respectively, he said.

The terminals will be available in September from Olivetti at 500 Park Ave., New York, N.Y. 10022.

# Printer Made for 3270 Types

ANN ARBOR, Mich. — Interface Systems, Inc. (ISI) has brought out a multifont printer that it said can print characters ranging from .1- to .7 in. high from the screen of an IBM 3270 or compatible CRT terminal.

The 4100SC is plug-compatible with IBM 328X printers. It can also print a variety of standard bar codes on 8-in. lines and can print at speeds up to 120 char./sec, according to the firm.

Applications for the 4100SC include materials handling and warehouse systems.

The printer is priced at $6,400 from ISI at 462 Jackson Plaza, Ann Arbor, Mich. 48103.

# CPT Micro-Based Unit Aimed at Office Sites

HOPKINS, Minn. — CPT Corp. here is offering a microprocessor-controlled, Selectric-type terminal for office communications.

The terminal is said to be compatible with a variety of line disciplines. In its standard configuration, it enters and receives Ascii data asynchronously at transmission speeds up to 300 bit/sec, CPT added.

The unit is also plug-compatible with the serial I/O port of calculators and computers.

The terminal costs $2,500 from CPT at 1001 S. 2nd St., Hopkins, Minn. 55343.

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## Bits & Pieces

### Memorex Introduces Line Of Double-Density Floppies

SANTA CLARA; Calif. — Memorex Corp. is offering a line of double-density flexible disks for use with its models 550 and 552 and equivalent flexible disk drives.

Three double-density Markette configurations are available: a soft-sector, single-sided disk with a storage capacity of 3.8M bits; a soft-sector, dual-sided unit with 7.6M-bit capacity; and a disk with 32 hard sectors and a 6.4M-bit capacity. All of the disks feature 77 track/side.

As a result of a proprietary surface coating, the disks perform at least 10% better in terms of bit shift and show a 20% improvement in signal resolution over competitive media, a spokesman claimed.

Markettes cost approximately $75 for a carton of 10, he added from the firm at San Tomas at Central Expressway, Santa Clara, Calif. 95052.

### Verifier Reads ABA Code

DALLAS — American Magnetics Corp. introduced a Magstripe Verifier here recently that reads and displays encoded American Bankers Association (ABA) data on magnetic stripe cards.

The unit, which has a 38-digit LED display, allows users to see what is encoded on the magnetic stripe and to verify that the card is encoded to ABA standards.

The $1,495 verifier is available from the firm at 2424 Carson St., Torrance, Calif. 90501.

### Punch Has Protective Case

CUMBERLAND, R.I. — The Digitronics Division of Comtec Information Systems, Inc. has a 75 char./sec punch mounted in a protective suitcase.

The P 8075/B punches 5- to 8-level data on 1-, 7/8- or 11/16-in. wide paper or mylar tape. Punching tolerances exceed RS-227A requirements, the firm claimed.

The punch sells for $1,995, from the firm at 53 John St., Cumberland, R.I. 02864.

### Pericomp Has Tracking Tape

NATICK, Mass. — A prerecorded tape that allows users to verify tape tracking has been introduced by Pericomp Corp.

The tape allows users to utilize an oscilloscope to determine necessary mechanical head adjustments. Outputs allow verification of correct forward and reverse, 7- or 9-channel tracking to within .0005 in., a spokesman claimed.

A 600-ft tape costs $120 and a 1,200-ft tape sells for $220 from the firm at 14 Huron Drive, Natick, Mass. 01760.

### And Saves $3,500/Mo

# Data Entry Cuts Claims-Processing Job

SEAL BEACH, Calif. — The Group Insurance Services Department of Rockwell International Corp.'s central payroll/-personnel operations has combined several functions into a single keying procedure using programmable workstations. As a result, the firm said, it is saving more than $3,500/mo in clerical labor while producing reports and documents more rapidly than before.

The Group Insurance Services Department processes hospital and medical claims for 47,000 employees in Rockwell International's aerospace, electronics and automotive operations, as well as for corporate staff employees, who are covered under one of two basic insurance plans. The claims-processing operation issues 1,300 to 1,500 benefit checks a day.

In the previous claims-processing operation, after incoming claims were coded and priced, a four-part worksheet was prepared, one copy of which was filed in the insured's claims file. Another copy was sent under batch control to the company's data center at Downey, Calif., for keypunching the data used to generate the "Classification of Benefits" report that goes to the insurance carrier and is the basis for reimbursement of benefits paid by the company.

Depending on the plan involved, other worksheet copies were batched and sent directly to the carrier for keypunching and generation of various statistical reports.

In addition, a copy of the worksheet was batched with payment dollars totaled and sent to three remittance advice typists in Group Insurance Services. After the four-part remittance advices were typed, an adding machine tape was then run to prove the totals to the batch controls.

The remittance advices were next forwarded for typing of the benefit checks and carbon copy check registers. The checks were signed, protected and totaled. The totals were proved to the batch totals, then audited against a copy of the worksheet and matched with the proper remittance advice.

The check and remittance advice were finally mailed to the payee. If the payee was the insured, a copy of the worksheet was enclosed. If the payee was other than the insured, the worksheet copy was mailed to the insured separately. The entire procedure was manual, including reconciling of the bank account.

"There were several obvious disadvantages in the system," Henry D. Mjellem, manager of Group Insurance Services, recalled. "The major difficulty, of course, was the labor-intensive nature of the operation from the time the worksheets left the pricers' desk with the resultant delay of issuing benefit checks.

"Aditionally, certain errors in the benefits detail area were not discovered until the keypunching and verifying functions were completed prior to running the classification of benefits report.

"We needed a system that would integrate all of the steps of processing benefit checks and capturing data for the reports with a single data entry procedure."

After a study of available hardware, Rockwell International selected the IBM 3740 data entry system for two reasons. "First, it provided us with a multiunit, stand-alone system that would not be affected by downtime which might occur in a system that used a central processor,' Mjellem said.

"Second," he continued, "since the system allows us to do on-site processing, the

(Continued on Page 32)

### Merged Technologies — Part 1

# Union of On-Line, COM a Winning Combination

**By William McCullough**
Special to Computerworld

The use of both on-line systems and computer output microfilm (COM) has increased dramatically over the past five years and there is every indication this growth will continue at an increasing rate in the forseeable future. These elements, used individually or collectively, can solve many of the problems associated with computerized information systems.

*This is the first in a three-part series that looks at the integration of on-line and COM systems by William McCullough, national sales manager for U.S. Datacorp, a COM service organization.*

Unfortunately, many organizations are overlooking the potential cost reduction and system enhancements possible by merging on-line and COM technologies. All too often, on-line systems are developed without any thought to the roles micrographics could play in meeting the requirements of the planned system.

The result can be a system that costs far more than necessary in software development and added computer hardware.

There are a number of reasons for this problem. Primarily it is a lack of knowledge on the part of systems designers regarding the ways in which COM may be used effectively with on-line computer systems.

This lack of knowledge can be attributed to a lack of user education by the COM industry compared with that carried on by the computer industry related to on-line technology.

There are six areas of concern with COM and on-line systems that should be examined. They are systems design and programming, data retrieval and output speed, distribution, comparative costs, real time/-current status and history/audit trails.

It is common knowledge among computer professionals that the design of on-line information retrieval systems is a lengthy and expensive undertaking. It requires a great deal of effort on the part of even the most sophisticated systems and programming staffs.

This is particularly true if the CRT is the principle or only media used to deliver whatever information is required from the total on-line information data base. If you are not certain why this is so, consider what it takes to get there.

There are three important aspects of on-line systems design and programming; loading, maintenance and back up. Loading includes data indentification, data preparation, file designation/allocation and file loading.

Maintenance includes programs for updating the data base, retrieving from the

(Continued on Page 31)

## How Far Can You Stretch?

Budgets are tight everywhere — especially in the DP department. Most managers are actively seeking ways to stretch the DP dollar, and many are succeeding.

Stretching the DP dollar will be the subject of a *Computerworld* special report in September. The report will cover many aspects of saving DP dollars, from choosing the right equipment for the right job to optimizing equipment usage.

Readers are invited to contribute articles detailing their experiences wrestling with DP budgets and what they did to save money. Success stories are welcomed, but details of money-saving schemes that flopped are also welcome.

Contributions should by typed (double-spaced, please), limited to 1,200 words (four or five pages) and sent by Aug. 15 to Frank Vaughan at CW, 797 Washington St., Newton, Mass. 02160.

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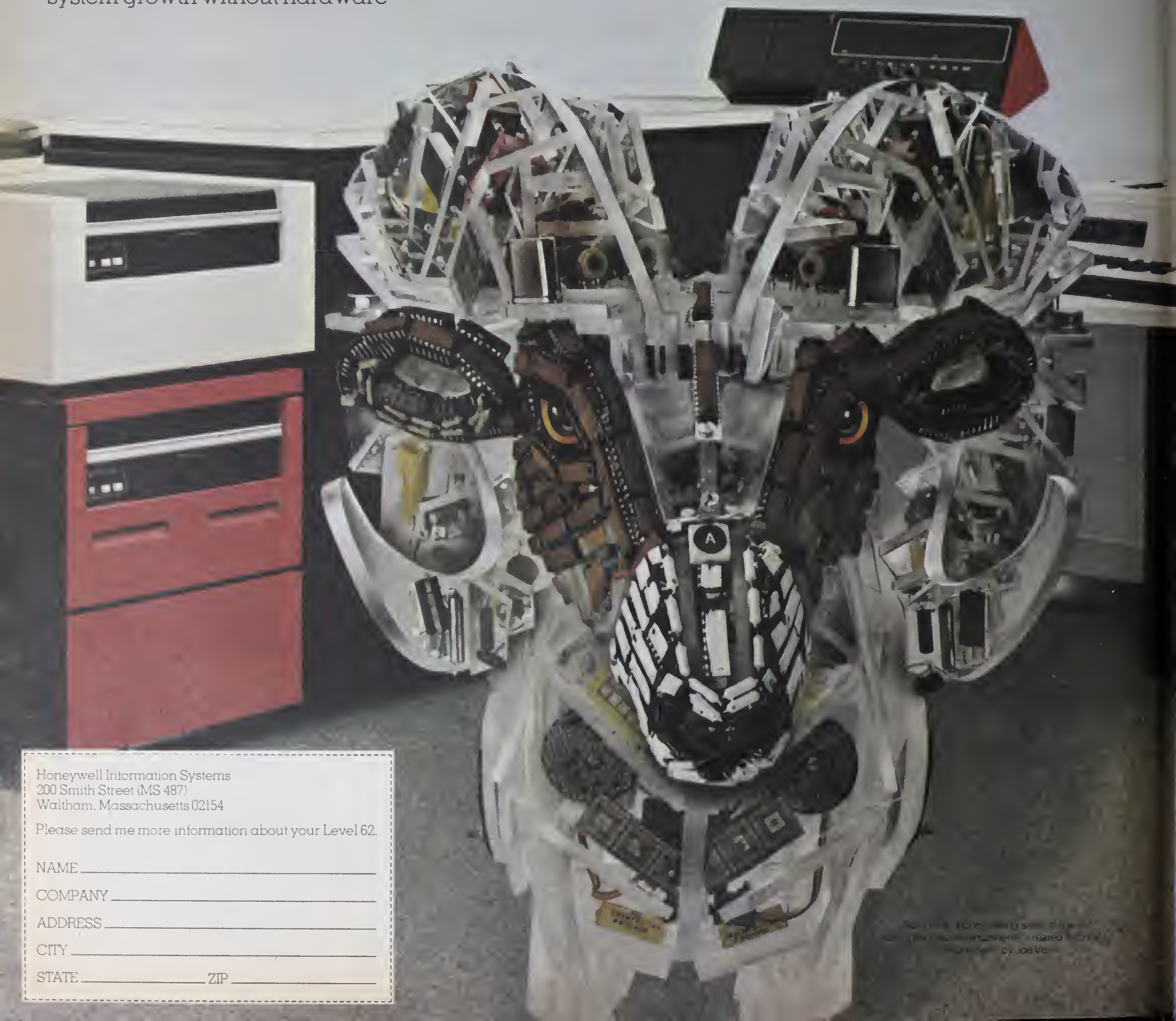

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# On-Line, COM Union a Winning Combination

*(Continued from Page 31)*

data base, preserving the integrity of the data base and purging from the data base. Backup includes media conversion, distribution and fail-soft.

It would be relatively easy to make a case against a true on-line system, particularly if time was taken to dwell upon the steps which are involved in each of these actions. Examine how much easier the job may become when micrographics, particularly COM, is combined with the on-line system.

For example, the loading task could be reduced to dealing with key fields, the computerized index to the COM data bases. The maintenance task can be similarly simplified to updating index pointers in the reduced size data base.

Programming for data retrieval from only a few fields and not all of the information in the total data base is proportionally reduced. Backup can be virtually built in, as COM-generated indexes could take over in the event of system failure.

Perhaps the most difficult task when considering COM in conjunction with an on-line system is to define the requirements of the system and determine how extensively COM might be used in the system. If the data base already exists, then the COM formatting software for creating the indexes described above is normally available from COM manufacturers and service bureaus.

The programming involved generally has to do with incorporating this software with the host programs which maintain the data base. Generally, this is neither a difficult nor lengthy task.

### Retrieval and Output

In discussing retrieval and output speed relative to on-line systems, we find ourselves talking about the glamour issue of the DP field which was brought to life during the 1960s. Although it is still very much alive today, the 1970s have been dominated by first the mini and now the microcomputer.

Those familiar with CRTs and on-line information retrieval systems know it is hard to beat their speed of output. But what did you have to *input* to obtain that output? How easy was it to learn the particular retrieval language of the system?

Can you get the answers you are really looking for? Only if the data is there and is addressable.

At the cost of becoming all-encompassing, some systems become too cumbersome, and this jeopardizes their processing time advantage.

What can be done to make an on-line system more effective and maintain those features most wanted by its users? A careful and unbiased analysis of the information contained in any large on-line data base should provide statistics on key fields, activity percentages, summaries vs. details and accuracy.

### Looking at Findings

In looking at the findings, several distinctions should soon become evident. First, a disproportionate share of the file receives the majority of the activity. Second and similarly, a small number of the data fields receive the majority of the action.

Considering the steps that were probably taken during the design phase of an on-line system to separate the wheat from the chaff, there still will be found data that is not really worth all the time and money it takes to store, update and retrieve it. Here is where an integration of COM-generated microfiche and the on-line system can best be introduced.

Overall speed of key information retrieval via CRT can be increased at no expense in data availability. The data entry or keying part of the retrieval can be simplified and combined with smaller files, less data to search and less to output to the CRT; a net increase in throughput should result.

All of the noncritical and detail information can be moved off-line to microfiche and, if needed, referenced on the CRT by fiche number and grid coordinates.

It cannot be denied that there are certain functions which rightfully belong to on-line systems. What I am attempting to emphasize is a method to enhance those functions and provide an even better total information retrieval system.

## Fiche Aid

SKOKIE, Ill. — Business Efficiency Aids, Inc. is offering the Model PI-100 Magnetic Micro/Finder Tray of high-impact plastic for storage and retrieval of microfiche.

The PL-100 includes 100 Magne Dex separator cards. Magnetized siderails provide a power supply to separate fiche for retrieval.

The unit, with four vinyl index guides and a vinyl dust cover, sells for $24.95 from 8114 N. Lawndale Ave., Skokie, Ill. 60076.

## Proceedings Published

PHOENIX — Honeywell Informations Systems, Inc. here has published the proceedings from its Computer Security and Privacy Symposium held in Scottsdale, Ariz., last April.

The proceedings cost $25 from Jerome Lobel, computer security manager, Mail Station K-99, HIS, P.O. Box 6000, Phoenix, Ariz. 85005.

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| Maximum Memory Available (KB) | 64 | 64 | 56 |
| Directly Addressable Memory(KB) | 64 | 2 | 56 |
| Automatic Interrupt Vectoring | Standard | N/A | Standard |
| Parity | Optional | Optional | N/A |
| Cycle Time (nanoseconds) | 600 | 800 | 725 |

| PRICE | 6/16 | NOVA 3/4 | PDP-11/04 |
|---|---|---|---|
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# Data Entry Integrates User's Claims-Processing Tasks

*(Continued from Page 29)*

documents do not have to leave the department. We can therefore have immediate reaction to error conditions, rather than having to wait for error reports to be returned from the data processing center."

Rockwell International's data entry system consists of one IBM 3741 Model 4 and four 3741 Model 3 programmable workstations, each of which has an 8K-byte core memory. The Model 3 units are equipped with dual diskette drives and two of them have printers attached, a 3717 line printer and a 3715 bidirectional character printer.

All of the workstations can be used for keying and, in addition, the Model 4 has the capability to transmit data to one of the six IBM 370/168s at the central computer center.

The previous multiple-typing tasks are now accomplished in one data entry procedure performed by three operators. Under program control, as the coded information from the worksheet is entered it is automatically run against tables stored in the program, with erroneous data rejected.

The program also adds dollar amounts and audits the check totals to worksheet totals during the input procedure; in addition, it displays the grand total of checks for balancing against predetermined batch totals.

The information is recorded on diskettes which are then placed in one of the workstations attached to a printer. The benefit checks are printed automatically with the remittance advice, which is now a stub on the check. The separate remittance advices are no longer used.

The check registers are also printed automatically on the printer-equipped workstation. At the same time, an output diskette is generated for transmission of classification of benefits and check reconciliation data to a central computer at Downey.

The classification of benefits report is now printed directly from the transmitted data, eliminating the previous keypunching and verifying functions,

"Although only three operators are required to handle all of the work in the present system, we trained all six of the typists who were doing the work before," Mjellem said. "Three of the employees filled other openings in the department and now provide backup during vacations or in case of illness of the three full-time operators."

### Biggest Advantage

"The greatest advantage has been in saving over $3,500 a month by reducing the number of people required to do the typing and data input from seven (including the full time of one keypunch operator) down to three, but we are realizing other significant benefits as well," according to Clarence P. Dietterich, manager of systems development for the central payroll/personnel operations.

"For example," he explained, "previously there was always a backlog of one or two days' work for the check and remittance advice typists, even though they frequently worked as much as four hours a day overtime. Now they can keep up with the large volume of worksheets generated by our 26 pricers, even during the big work crunch that typically occurs during January and February.

"Overtime is now practically nonexistent and the workload is up-to-date at the close of each day."

Greater accuracy is another area in which the data entry system has been of great advantage, Dietterich said. Since all of the edits and audits are built into the system, corrections are now made at the point of entry.

This in turn has speeded up the job of balancing and printing the monthly "Classification of Benefits" report. In the past, this report usually could not be completed until after the middle of the following month; it is now mailed no later than the ninth day of the month.

The information transmitted from the diskettes is also used at the data center to create a magnetic tape which is now sent to the bank. This enables the bank to reconcile the account on its own computer, thereby eliminating the need for manual reconciling by Group Insurance Services personnel.

"The system has also made it possible for us to achieve additional savings by eliminating the four-part remittance advice forms and the carbon copy check register. Moreover, we no longer incur the expense of buying and storing data cards. We require no more than about 150 diskettes for recording all data, and these are continually recycled," Dietterich said.

"Since we put the system into operation, our complete claims-processing cost of about $3 a claim has been maintained in spite of increasing labor costs — a very low figure in comparison with average claims-processing costs throughout the country," he concluded.

# Emerson Designs UPS For Big Applications

SANTA ANA, Calif. — Emerson Electric Co. has introduced a 415 Hz uninterruptible power supply (UPS) system designed to allow users to enhance present UPS systems.

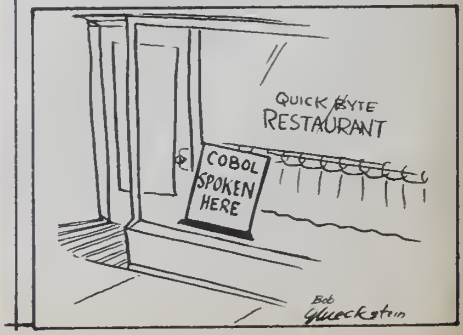
The AP91 is compatible with existing Emerson 60 Hz products and can utilize a common battery to save space and equipment costs, according to a spokesman.

Standard features include alarms, adjustable battery charging rate, dc ground fault protection, dc under- and overvoltage protection, manual output voltage control, input current limiting and input line protection.

Options for the AP91 include ac ground protection, alarms and indicators, line dip compensation, meters, remote meter and alarm panels, shipping breaks, switchgear and a 50V proportion signal.

An AP91 system costs approximately $35,000, depending upon configuration. The battery is an additional $10,000 to $15,000, depending upon capacity.

The battery must be purchased separately, the spokesman noted from the firm at 3300 S. Standard St., Santa Ana, Calif. 92702.



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## Mini Bits

### Maker of Array Processors Establishes Group for Users

PORTLAND, Ore. — Floating Point Systems, Inc. has formed a users group open to users of its array processors and "those making significant contributions to the technology."

The group will sponsor meetings and papers about the technology, the firm said. At the first meeting, 47 users heard papers on subjects ranging from speech processing to physical chemistry, the company noted.

Users wanting more information should contact Lynn McDaniel, the user group coordinator, at P.O. Box 23489, Portland, Ore. 97223.

### Mailing Envelope Designed To Protect Floppy Disks

SMYRNA, Ga. — A mailing envelope for floppy disks said to save users 44- to 50 cents per disk in first class postage is available from Curtis 1000 here.

The envelopes accommodate one to five floppies in filing sleeves and are said to provide a lint- and dust-free environment. They are reportedly resistant to tearing and puncturing forces and protect the disks against chemicals and wetness.

Prices for the envelopes vary from about 14 cents each in very large quantities to 27 cents each in quantities of 100. The company is located at 1000 Curtis Drive, Smyrna, Ga. 30080.

### Swap Proceedings Published

LOWELL, Mass. — The proceedings of the 1976 Society for Wang Applications and Programs (Swap) users society symposium is available. The 725-page publications contains over 50 papers presented in seven sessions.

A copy of the proceedings can be obtained for $17.50 from Wang Laboratories, Inc., Swap Users Society, One Industrial Ave., Lowell, Mass. 01851.

### HP Has Mini-Based GC/MS

PALO ALTO. Calif. — The Hewlett-Packard Co. 5990 series gas chromatograph/mass spectrometer (GC/MS) incorporates an HP 21MX E-Series system with a dual-disk drive, according to the vendor.

The GC/MS is fully integrated into a desklike cabinet that sits atop the two-bay data system, HP said. Because the operating system provides compilers for Fortran II and IV, Algol and Assembly language as well as a Basic interpreter, users can develop their own programs for the unit, the firm noted.

A basic system excluding CRT terminal costs $70,000, HP said from 1501 Page Mill Road, Palo Alto, Calif. 94304.

## *The Turnkey — Part 2*

# Users Must Determine Needs in Advance

**By Vincent Deschamps**
Special to Computerworld

It is singularly important for users to establish the criteria that are to be used as the selection and contract standards for a turnkey system. Users must determine their requirements in both hardware and software.

One of the first areas to be tackled in the hardware arena is determining what is needed from input devices. Find out the volume of transactions to be processed through the system, because this will help you establish the amount of power a mini must provide to perform your applications. The number of input devices will be determined by your workload.

Consider peak work periods for determining volumes of transactions. Peak work periods are indicative of maximum volume; off-peak levels will not give you the real parameters of the requirement you have for input devices. Seasonal effects must also be considered if volumes are affected.

Determine how many people need or should be able to gain access to the computer at the same time.

Availability of the computer should be based on a need for instant information. Analyze how many people need instant information at the same time.

*This is the second article in a three-part series dealing with how to successfully install a turnkey minicomputer. Next week's installment will include recommendations for implementation procedures and scheduling.*

Establish whether input devices can be shared by personnel without inconvenience. Key executives in one or more departments may need immediate access, but that does not necessarily mean each one requires his own terminal.

Determine whether the device should offer video or print capabilities or whether the user needs both.

### Data Base Size

To determine the size of the data base, list every type of data to be stored, such as number of customers and number of inventory items. Then determine the approximate number of characters needed per type and amount of data.

Finally, analyze this data base according to peak periods. Figure the maximum size these files will be during the year. To figure out hard-copy output requirements, determine how much data needs to be printed daily, weekly, monthly and quarterly. Massive volumes of computer printouts are expensive and not necessarily meaningful and useful in a real-time computer system.

Next, determine the time frame you're willing to live with from the time data is prepared to the time it is to be printed and delivered. It is important to establish how many printed copies are required on the basis of utilization — not desire. Your result will determine the type and speed of the printers necessary.

Accessibility of the data base is another criterion users should consider.

First, establish the times data is required and make your decision on whether the requirement is immediate, once a day, once a week, once a month or once a year.

Next, establish the volume in each of the categories.

Determine the format or media for each type of data to be presented — soft copy

*(Continued on Page 34)*

# Desktop CPU Wins Over User By Easing Market Research Job

**By Esther Surden**
Of the CW Staff

BIRMINGHAM, Ala. — "From talking to my colleagues around the country, I've heard that even if you have access to a big computer, the market research department always comes after the janitor in getting use of it."

With these words Thomas M. Adams, manager of public affairs for the *Birmingham News* here, told why he likes using his small desktop minicomputer system.

Adams didn't always enjoy using the small system; in fact, he resisted the switch from an Olivetti calculator to something more complicated.

"I used the Olivetti for market research data, but I also had to do rate schedules and amortization schedules with it. With the way interest is going up, we would overload the Olivetti," he explained.

"We finally got the Hewlett-Packard desktop system after the general manager wanted me to run something he was working on and the calculator couldn't handle it," he recalled.

The department looked at systems from Wang and Rockwell International before choosing the HP 9815. "I didn't want to learn how to program it, so I said 'You get me someone to program it, and I'll take it,' " Adams said.

The newspaper got a programmer right out of college to program the system, "but he just couldn't handle it. He'd learned Fortran and Cobol."

Next Adams looked around for a school that could teach him how to handle the system — but there wasn't one. HP didn't have a training program, he said, and the colleges had bigger things on their minds.

Finally, he found a freelance programmer

*(Continued on Page 34)*

# AJ Extends Options for Novices

SAN JOSE, Calif. — Joining the other terminal makers that now offer small business systems to first-time users, Anderson-Jacobson, Inc. (AJ) has introduced a system it said features multiprogramming capability and can accommodate up to eight terminals interactively.

The AJ 1500, built around an updated version of the Eldorado Electrodata Corp. CPU, is diskette-based, unlike the older system. It was designed for certified public accountants and accounting practices.

### Accounting Software

The accounting software, designated CPA III, includes programs for general ledger, budget accounting, non check-writing payroll and loan amortization. Optional packages such as accounts receivable, accounts payable and payroll with check writing are also available.

A text editor for word processing can also be added to the system, AJ noted.

Available through a network of dealers, the system can be compared to the Burroughs B80 and IBM System 34 for most of its functions, an AJ spokesman said. Service will be provided through AJ's service centers in 40 cities, third-party service or local dealers depending on the location, he added.

A basic AJ 1500 includes 32K bytes of core memory, two 630K double-density diskette drives and a 45 char./sec daisywheel I/O console printer.

Optionally, the AJ 1500 system can be expanded to include 64K bytes of core memory, four diskette drives and four 10M-byte cartridge disk drives. Users can also select a 60- or 120 char./sec dot matrix printer, a CRT or a 300 line/min printer.

The basic system costs $19,990 including the CPA III software, the company said from its Computer Systems Division, 521 Charcot Ave., San Jose, Calif. 95131.

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# University Slates Short Mini Course

MILWAUKEE — A short course on minicomputer and microcomputer systems will be held at the University of Wisconsin Extension here Sept. 26 - 30.

The course is designed for engineers, scientists, system designers, system programmers and applications specialists who want to expand their knowledge of computer hardware and software, according to a spokesman.

It is intended to teach computer programming fundamentals on which "the more advanced topical coverage of the later portions of the course will be based," he noted.

The course costs $375. Information is available from John T. Snedeker, Department of Engineering, University of Wisconsin Extension, 929 N. Sixth St., Milwaukee, Wis. 53203.

# Users Must Analyze Needs in Advance

*(Continued from Page 33)*

(CRTs) or hard copy (printed report). Make this decision based on whether a screen response is adequate or whether a printed document is necessary, under what circumstances and how often.

**Software Considerations**

In the software area, find out if the vendor provides proven applications program packages. These are always less troublesome and less expensive than customized packages if they fit your application.

If they don't fit, they will be more troublesome and more expensive in the long run.

Make a list of software capabilities you require of the vendor. Make sure it already has or can deliver efficient software packages for your specific applications at a reasonable cost.

This is expecially important because, to the unsuspecting, software can cost more than hardware, especially if it involves custom development.

Favor the vendor who has experience in your industry. If many companies within one industry have different requirements, you can believe that most companies in different industries have multitudinous varieties of requirements.

Finally, make sure the vendor is contractually agreeing to take "turnkey" responsibility. "Turnkey" means making sure all the hardware and software is delivered, installed, operational, debugged and documented. In simple words, you plug it in, switch the power on and your system is ready to go.

Since the purchase, lease or rental of a minicomputer system represents a significant investment, all of the elements in the contract should be delineated:

- All responsibilities of the vendor and user should be clearly defined.
- There should be a finite plan which details the development of the system from beginning through installation as an integral part of the contract.
- The contract should also stipulate that complete documentation will be provided by the vendor.

*Deschamps is president of Turnkey Sales & Leasing, Inc. in New York City.*

# Desktop Mini Wins Over User

*(Continued from Page 33)*

who knew the system. "He was going to do all the programming, but when he charged $1,000 for one application" Adams had second thoughts.

"I took home one of the applications and a book explaining the system and worked it out on paper. I became so confident that it would work that when I tried it it did work," he said.

That began the public affairs manager's love affair with the system. Since then, the department has been using it for a variety of applications.

"When the marketing research operation was first initiated in 1969, its primary aim was to provide reader profiles to the editorial staff," he explained. "But, after accumulating all of the data, we realized what a tremendous help the information would be to area businesses.

"Now, after seven years of surveys, we find that many businesses have come to rely on us — anxiously calling weeks before the due date to check our status," Adams said.

The procedure for gathering an audience profile may take as long as six months. Researchers from an outside consulting firm visit an average of 125 homes per month in the Birmingham area — 1,500 per year — with a list of questions to ask each member of the household.

Through the years, this list has been expanded and refined until it presently includes detailed questions about reading, shopping and living habits.

Survey data is entered into a large outside time-sharing computer located in Dallas, Texas, for batch processing. The results are returned to Adams through a terminal located at the newspaper.

"Time-sharing is expensive, so we use it as little as possible. That means we try to minimize the work done by the large computer to only the large statistical correlation problems. The smaller computations, finishing touches and final printing are all accomplished on our desktop system," Adams said.

"The survey results, as they return from the time-sharing system, are entered into the 9815. The small computer then further processes the information into a readable format complete with line and bar graphs.

"By using the system with an HP printer, we can produce final printed copies without incurring the added expense of hiring a layout and paste-up person."

The editorial department of the *Birmingham News* uses the system to plan story features to meet reader interest. The advertising department uses the report to sell advertising, test ad campaign effectiveness and adjust rates. Area business firms that subscribe to the service use the information to develop marketing strategy.

One area firm, planning to open two more stores, consulted the report to choose the best site locations. The firm was provided with a list of recommended and alternate locations.

Adams has also been contacted by a number of national firms interested in moving into the Birmingham area that want a profile of the average employee and customer.

Another job of the computer is computing and adjusting advertising rates and printing new rate cards. This operation, which used to take a day and a half on an adding machine and typewriter now takes a minute and a half on the small system.

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# Firm Sold on Open-Minded Programming To Solve Sales Problems Using Mini

GRAND RAPIDS, Mich. — Because "we didn't want to get locked into a type of thinking in which we were going to serve the computer instead of the computer serving us," Bob Jones Corp. had its small business system programmed by a company that had an "open mind," according to Bob Tourek, president of the company.

The firm went the small business system route after using a service bureau for several years and even doing some in-house keypunching. It chose an IBM System 32 after looking at several alternatives. It "was the only one that could fulfill a secretarial function," Tourek stated.

Then the firm searched for a programming company to fill its needs. Several were suggested by IBM and after interviewing representatives from all of them, Bob Jones chose Computer Directions, Inc. The firm was just starting out, Tourek explained, and it was flexible enough to see the computer as a tool for solving sales problems.

The system, which captures and maintains data on sales histories to produce a number of reports, prints the reports in a format that is easily understood by both the salespeople and the customers.

Other reports compare year-to-date sales figures for the current year and the previous year as well as the sales figures for the same three months of the previous year. This allows the company to evaluate sales for the current year in relationship to the same period last year and plan sales tactics, he explained.

Promotion reports are used to help account for large fluctuations in sales and to evaluate the success of specific types of promotions.

The system also provides trend reports comparing average weekly movement for the previous 52 weeks with similar figures for the prior 52 weeks. These reports, detailing the movement by item for specified customers, identify trends, distribution holes and new distributions.

The system is also being used to maintain data on brokerages due. Sales volumes and brokerage receipts can be reported by customer type (grocery, nonfoods and food service) or by item type (grocery, frozen, dairy, meat and nonfoods).

Reports are produced on demand, thus eliminating the unnecessary production of paper volume. The parameters for the reports are entered by the operator so the reports can be limited to certain time periods, certain principals or certain items, Tourek said.

The data for the system is obtained from orders and invoices. Customer orders are entered on the computer, and orders are printed for mailing to the principals.

Daily and weekly reports are printed to provide order volume data and to compare this week's orders to those for the corresponding week from last year.

When invoices are received, only the exceptions to the orders need be entered. At that point, the computer captures the sales data and retains it for two years, Touret noted.

The system, which was installed in November 1975, is an IBM 32 with a 16K memory, a 9.1M-byte disk and a 100 line/min printer.

The software was developed by Computer Directions, Inc. and was designed for interactive processing, Marilyn Doig of Computer Directions explained.

## Basic/Four Printer Fits Model 400 Unit

IRVINE, Calif. — Basic/Four Corp. is offering a 150 line/min printer for its Model 400.

The Model 3152 line printer features a standard 96-char. upper/-lower case capability and double-height characters. Underlining can be produced for report titles on forms up to 16 in. wide, the firm said.

The printer costs $7,900 Basic/-Four said from P.O. Box C19550, Irvine, Calif. 92713.

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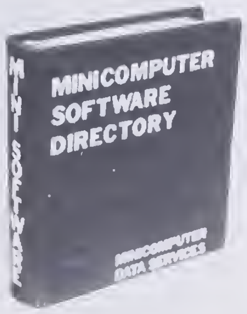

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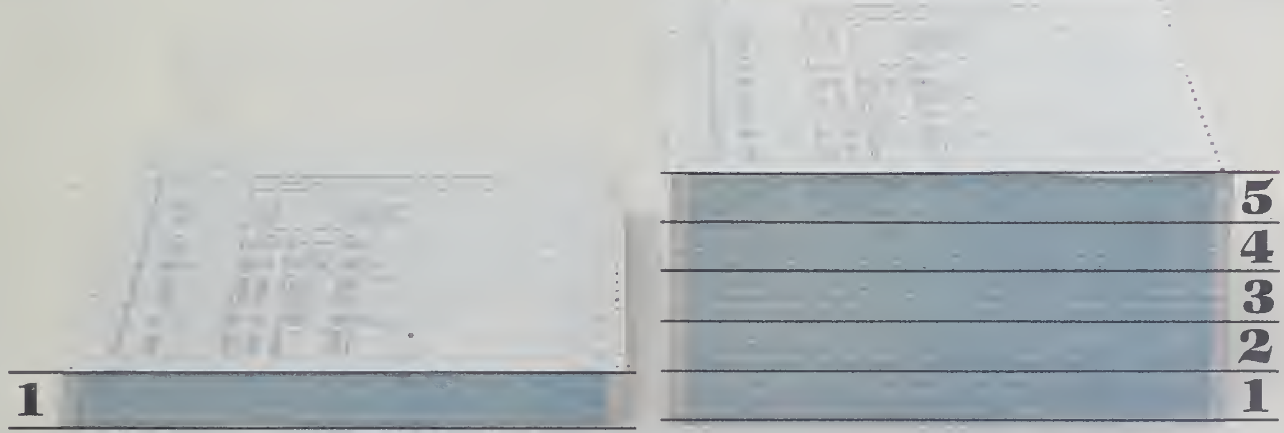

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# Bicaroe System 2 Runs IBM 32 Industry Applications

CUPERTINO, Calif. — A small business system that reportedly runs IBM System 32 Industry Applications Programs (IAP) and costs between $15,200 and $24,200 is being offered by Bicaroe, Inc. through dealers.

The System 2 uses up to four double-sided, double-density floppy disk drives, a built-in CRT with 1,024 characters and either a daisy wheel or matrix printer in one desk unit.

Maximum storage capacity with the diskettes is 4.8M bytes, the firm said.

Two system control programs (SCP) are available for use with the IAPS and for programming Application Control Language (ACL), which IBM developed for use on its 3741 data entry system. An ACP occupies 16K of memory.

The Bicaroe System 2 will also run the IBM System 32 RPG II and utilities, which may be licensed from IBM, Bicaroe added.

The ACL supports a maximum of 32K bytes of user memory and provides arithmetic functions; CRT, printer and diskette I/O; keyboard entries; table searching; check digit verification and other functions, Bicaroe stated.

With ACL, the memory is segmented. An ACL translator requiring 8K bytes is also provided. Three passes of the program are required to assemble a complete program, the firm said.

The firm provides free utilities to copy diskettes, sort and merge diskettes or to use as a diskette directory and a listing of table contents.

### Six Basic Packages

Six basic accounting packages are currently available free from Bicaroe: order entry, accounts receivable, general ledger, payroll, accounts payable and inventory management, according to the firm.

Bicaroe is interested in hearing from System 32 users who have developed their own programs, as it wants to build a library of programs for its users, a spokesman added.

The System 2's processor cycle time is 125 nsec. The CPU is comprised of discrete components on two 8-in. by 10-in. circuit boards. Memory cycle time is 600 nsec per 1-byte access, the firm said.

The minimum configuration machine has 24K bytes, one diskette drive, a CRT, a daisy wheel printer with a speed of 45 char./sec and a keyboard. It costs $15,200, according to the firm.

The maximum configuration consists of 64K bytes, four diskette drives, a 200 char./sec matrix printer and communications features. It costs $24,200, Bicaroe indicated.

The optional data communications feature provides bisynchronous capability up to 9,600 bit/sec.

Service is available through TRW. First shipments are scheduled to begin this month. Bicaroe is at 20730 Valley Green Drive, Cupertino, Calif. 95014.

# Turnkey Handles Manufacturing, Accounting Control Situations

SANTA MONICA, Calif. — Disc/310 Corp. has an on-line minicomputer-based turnkey system for manufacturing and accounting control applications.

Based on Data General Corp. Nova or Eclipse CPUs, the system is said to handle several costing methods including standard lot costing and actual costing and to include provisions for multilocation inventories.

Other features include multilevel indented bill of materials explosions; where-used implosions; work-in-process control for either a job shop or production line and serial number control, the company stated.

The system also handles invoicing from work-in-process by job number and serial number, time-phased material requirements planning and labor capacity planning, a spokesman said. Traditional applications such as order entry, accounts receivable, payroll, sales analysis and purchase orders are also accommodated by the turnkey unit.

A typical system with 64K bytes of memory, a 10M-byte disk drive, two CRTs and a 300 line/min printer costs $70,000 including software or leases for about $1,400 monthly under a third-party five- to seven-year agreement. "Each software system is customized to fit specific end-user requirements," a spokesman added. The company is located at 1840 Lincoln Blvd., Santa Monica, Calif. 90404.

# Controller Expands Dataflux Disk Line

SUNNYVALE, Calif. — Dataflux Corp. has added another controller to its line of fixed-head disk storage systems.

Designated the DC-111, it enables Digital Equipment Corp. PDP-11 users to operate in rugged environments, the firm claimed.

The controller is available in configurations transparent either to DEC RK05, RF11 or RC11 controllers.

As many as eight Dataflux Model 980 fixed-head disk drives may be daisy-chained and run through a single DC-111 controller, to provide up to 16M bytes of storage, the firm said.

"The DC-111 makes a fixed-head disk 'look' like a moving-head disk to the PDP-11 minicomputer," a spokesman claimed. This feature allows the user to bootstrap, or self-load directly from the disk, he added.

The controller is said to be transparent to RSX-11 or RS-64 operating systems and fully compatible with the DEC Unibus.

Packaged on three DEC-type "quad" boards, the DC-111 is mounted as a four-slot system unit. This unit can be installed as a subchassis in the CPU, or else it can be ordered with a separate chassis of its own.

The Model 980/DC-111 system uses the Dataflux Disc Cell, an interchangeable fixed-head disk cartridge containing spindle, Winchester-type media and read/write head assemblies.

This cartridge, packaged and sealed to work in severe environments, is available in storage capacities ranging from .5M to 4M bytes.

The DC-111 controller costs under $4,000. As a complete outfit, the Model 980/DC-111 system is priced at less than $10,000, Dataflux said from 1195 E. Arques Ave., Sunnyvale, Calif. 94086.

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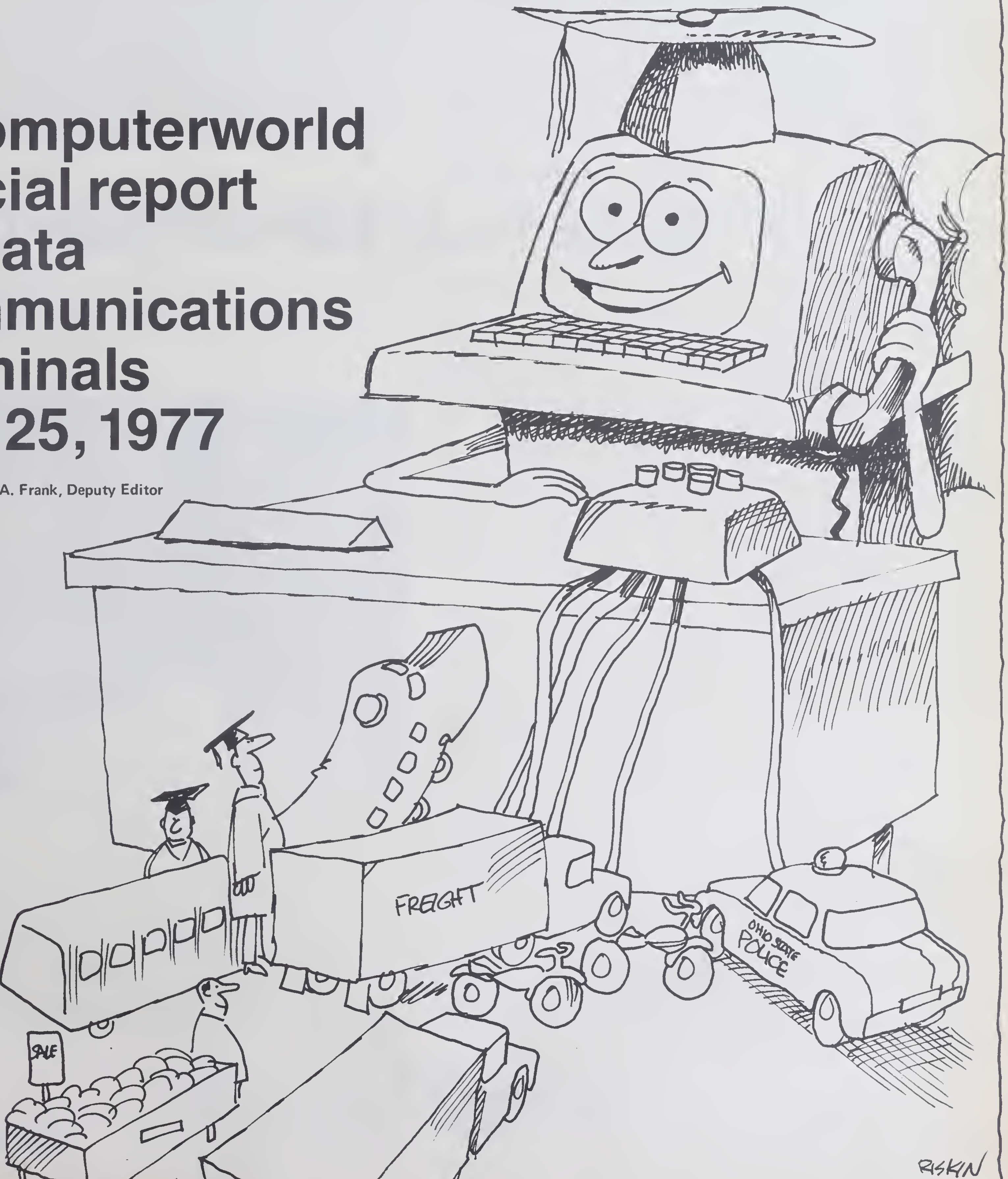
# Making the most of TERMINAL INTELLIGENCE

## A Computerworld special report on Data Communications Terminals July 25, 1977

Edited by Ronald A. Frank, Deputy Editor



## But Present Terminals Will Stay

# X.25 Standard Holds Promise for Potential Users

**By Mark S. Radwin**
Special to Computerworld

A lot has been written in the last two years chronicling the transition of the X.25 protocol from a proposal developed and promoted by a small group of individuals to the CCITT international standard method of access to packet transmission networks. This article will concentrate on some of the practical implications of its use rather than describing the protocol itself.

Although X.25 has been mandated worldwide as a device-independent packet mode interface for public packet networks in operation or under development, and although its usefulness is abundantly clear, it will not eliminate the support of device-dependent interfaces for the hundreds of thousands of existing Teletype-compatible, IBM 2741-compatible and remote batch terminal devices.

Clearly a public packet network cannot obsolete the huge investments in installed-base nonintelligent terminals. Even though sales of intelligent terminals are now increasing, it will be many years before they outnumber nonintelligent models.

### Easy Interconnection

Although X.25 protocol terminals will not supplant existing terminals and protocols overnight, they embody a number of compelling advantages for potential users. The first striking advantage is their high degree of interconnectability to computers and application programs.

Currently most of the higher speed synchronous terminals are connected in rigid star networks emanating from single host computers. Before IBM's Systems Network Architecture (SNA) and comparable subsequent offerings from other mainframe manufacturers, an individual terminal was typically dedicated to a single application and its corresponding telecommunications access method on a single host CPU. SNA, as originally announced in 1974, added another minor dimension, permitting one terminal to work with multiple application programs on a single CPU.

Recently a further extension was announced that will allow for the interconnection of several properly configured IBM 370 CPUs. A terminal attached to the IBM 3705 front end of one CPU can connect to an application program in another through the leased lines that interconnect the 3705s of the networked machines.

Digital Equipment Corp. has gone one step further, with Decnet providing this form of network access to several DEC families of CPUs.

The packet networks to which X.25 terminals will attach provide the user with three additional dimensions of interconnectability. Interconnectability is offered to a very large number of host computers from a variety of manufacturers, a growing number of commercial and academic vendors of computing services not available in a closed corporate network, no matter how large, and an increasing number of host computers and terminals located in many foreign countries beyond the economic reach of closed networks and made available through the international interconnections of packet networks.

As all operational packet networks and those under development have announced intentions to support the X.25 protocol, X.25 has also become the most probable network lingua franca. Its suitability for this role is being advocated by the principals who championed its original adoption.

### Error-Free Transmission

One outstanding advantage of packet networks is built-in error-free data transmission. Through sophisticated error detection and retransmission techniques, the network offers extremely low probabilities of undetected errors in data transmitted internally. Extending the network's internal protocol right up to the host computer interface, as Tymnet does in both its asynchronous and binary synchronous Tymcoms, completely protects this transmission link from errors.

The Achilles heel that remains in operating networks is the unprotected path between the network node accessed by the user's non-packet mode terminal and the terminal itself. Currently, most error detection is achieved by combining full-duplex network echoplexing of user inputs with character parity generation and checking by the terminal.

The X.25 protocol for packet mode terminals (or host computers) protects this final link with cyclical redundancy checks (CRC) for errors and subsequent retransmission. Thus the protocol implements total end-to-end error detection and correction by retransmission.

Because a packet network can perform character set translations, totally dissimilar and hardware-incompatible terminal types can communicate with each other.

There are a number of economic advantages to using X.25 to connect intelligent packet mode terminals to a network. The principal cost advantages appear to derive from cluster configurations, in which a moderate number of terminals are, on average, simultaneously connected through the network to various processors or application programs.

It should be noted that the X.25 protocol is, in effect, the equivalent of a packet-interleaved time-division multiplexer (TDM), allowing — in theory at least — up to 4,096 simultaneous logical connections. Although adequate pricing information is not yet available, the total cost of an X.25 terminal cluster controller is expected to compare favorably with that of a pair of intelligent TDMs and the required asynchronous network ports.

Heavily used X.25 interfaces can clearly save dollars by avoiding the telephone company's Single Message Rate Timing (SMRT) charges. In states where SMRT charges have already been levied, such as California, each locally dialed telephone call placed by a business line begins accruing a one-cent-per-minute charge after the inital few-minutes period. This new charge of 60 cents per terminal hour represents a significant monthly expense for an intensive user of network services.

With X.25, access to the packet transmission network is accomplished through a single four-wire leased line and synchronous modems. To evaluate the relative economics, a potential user should compare the cost of the leased access line and modems plus the network access charges for an X.25 port with charges for an equivalent monthly volume of non-packet mode network access and SMRT costs.

Accurate calculations, of course, cannot be made until prices for the X.25 cluster controllers and their associated terminals become available along with the tariffs for X.25 access to the packet networks. However, reasonable projections can be made, and the crossover point at which an X.25 cluster controller becomes economically advantageous appears to lie between five and 10 terminals connected on average throughout the full business day.

*Mark S. Radwin is manager of operations for the Tymnet, Inc. communications network.*

## With 400 Terminals

# Mo-Pac Tracks Railroad Freight Cars

ST. LOUIS — Practically everyone, at one time or another, has enjoyed running a toy railroad.

But consider a full-sized one with 1,100 locomotives and 96,000 freight cars in motion along 11,000 miles of track in 12 states or being loaded and unloaded at 100,000 customer sidings. Running it requires receiving 135,000 messages and sending 160,000 messages daily.

To perform the tasks which these figures only begin to describe, Missouri Pacific Railroad (Mo-Pac), one of the nation's largest railroads, has developed a computer information, communications and control system. The related software is larger in scope and more complex than that used by the nation's largest airlines or by the Apollo space program, according to Mo-Pac officials.

Called the Transportation Control System (TCS), the Mo-Pac system employs over 400 on-line computer terminals — including 91 recently installed Memorex display stations. The network also includes minicomputers throughout a vast territory that, like the railroad itself, runs from Chicago to Laredo and El Paso, Texas, from St. Louis to Pueblo, Colo., and from Kansas City to New Orleans.

The network's hub is located at the 125-year-old line's headquarters here where many of the corporate managers, accountants, bookkeepers, clerks, schedulers and customer service managers store and retrieve the information they need to run the railroad efficiently. The 91 Memorex 1377 display stations are used throughout the headquarters building.

### All-Day Work

"Our new 1377s have been readily accepted by the people who use them," John Brennan, senior project manager at Missouri Pacific said. "The improved clarity and nonglare screen are easier to work with especially when sitting at the CRT the entire day."

A replacement for the IBM 3277-2 station, the 1377 CRT is designed for entering and displaying data on-line to an IBM 360, 370, 3 or 3790 communications system. In Mo-Pac's case, the 1377s are used with a 370/168.

One of its features is the screen's bottom line, which is devoted to status advise. A digital indicator here displays both the column and line location of the cursor symbol. This feature is important when an operator is required to position data on an unformatted screen, Brennan noted. The status line is also used to alert operators of the terminal's condition, e.g., System Available, Insert Mode, etc.

As cars enter the railroads system, whether from customers or from other railroads, clerks send the computer designation and handling instructions for each car. The CPU then indicates where the car is to go next. Cars are put together and the 370 is informed of their makeup. The mainframe then sends lists of trains ahead to interested parties.

**Operations control officer at Missouri Pacific Railroad's transportation center monitors locomotives, using Memorex 1377 display stations.**

Generally, only cars handled differently from the way the 370 has instructed need to be reported back. Train departures, arrivals, interchanges of equipment and other railroad events are sent to the system continuously.

Based on the continuous reporting of a large set of railroad events, it is the CPU's responsibility to keep track of every car and every train on the railroad, Brennan said. The host is also required to keep an inventory of every classification yard and many industrial areas. This information is immediately available for inquiry by anyone in the system, he noted.

Special on-line reports are available to the people who need accurate information fast. The information is also used in various accounting and management analysis reports run after the fact by an off-line processor, he added.

In addition to the display stations tied to the 370/168, about 300 other CPU links are maintained along the railroad. These include a mix of Incoterm and IBM terminals and 20 Digital Equipment Corp. minicomputers, Brennan said.

The terminals operate on large multidrop networks, he stated. A variety of other communications systems are in use, including full-period dedicated private lines, a company-owned microwave system and Western Union facilities. The entire system operates round-the-clock.

One place where Memorex terminals are used is in the railroad's operations control center. Three are dedicated to the department known as the operations control transportation center, which has responsibility for management of locomotives.

Ten of the display stations are also used to perform a similar task with regard to freight cars by Mo-Pac's central car control. This aspect of the still developing TCS is aimed at monitoring and regulating the process of

*(Continued on Page S/6)*

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# Ashland Network Keeps Petroleum Products Moving

ASHLAND, Ky. — Ashland Oil, Inc. has developed a distributed data entry and processing network that reportedly will provide the company with a significant annual savings.

The network of 21 Sycor 350 intelligent data communications terminals reduces Ashland Oil's costs on each truckload of products shipped from company refineries and shipping points by reducing the time necessary to get an invoice to the customer. Former methods included either mailing or facsimile transmission of shipping documents to Ashland and preparation by keypunch for billing. Today when a customer truck leaves the refinery or shipping point with a load, the invoice will normally be mailed from the Ashland office the next morning.

Besides the time and associated cost savings, there are many other benefits from the network, according to D.H. Howard, assistant general manager of computer science and services. The actual "bottom line" savings, however, was what convinced the company to proceed with the plan developed during a 1973 study of how automation could best serve the company.

### Oil Allocations

A good example of how this movement of data helped in a more humanitarian way was provided by the soon-to-be-legendary "Winter of '77." With the State of Ohio and Western New York virtually closed by bad weather, the Ohio River frozen to barge traffic, no mail moving and airports closed, the Ashland Oil data network enabled the company to allocate badly needed heating oil to hospitals, nursing homes and other priority users and tell its distributors where to send trucks to pick up oil, Howard said.

Most of the benefits from the network are not so dramatic, yet are just as important to the company, he noted. One obvious benefit was the reduction of a large keypunching job and the following edit and verification runs on the company's IBM 370/168. This represents a significant savings in people time and workload on the mainframe, Howard said.

In fact, switching the actual data entry from a central keypunch operation back to the source at refineries and shipping points has proved very successful, he stated. The user now has complete control of billing data sent to the computer, since the billing department controls the master terminal at its headquarters and the 21 terminals in the network.

The employees entering data at the source are barge and truck loaders, not computer-oriented people. Yet they have been receptive to the terminals, according to Bob Wessell, manager of invoicing for the corporation's petroleum company.

They have found the terminals easy to operate and have seen their paperwork cut significantly, now entering each shipment on the terminal only once, he noted. Under the old manual system, each shipment was logged for billing, inventory control, sales information and allocation allowance. "It's no wonder they like the new system. It has made their jobs easier and faster," Wessell said.

When a shipping point terminal is activated, it displays a function screen with 18 options from which the operator can choose the one currently needed. To process an order, the operator selects the order entry function and a screen format appears requesting a customer number, Wessell explained.

When the customer number is keyed, the 350 terminal checks its files on one of two diskettes and displays a list of products for that customer and requests storage tank numbers for those products being ordered, he said.

When the product code and tank number are entered, the terminal checks to assure that it is a valid product, used by the customer and stored in the specified tank. Finally, the amount of product shipped is entered and the entire transaction is stored on diskette.

Twice each day a master station terminal polls the network — an automatic operation, using Sycor's network control software and auto dial features — gathering shipping information for the billing department and storing it on magnetic tape. The tape is hand carried to the 370/168 for processing. Approximately 98% of all orders entered go straight through the billing cycle, a great improvement in productivity over former methods, Wessell commented.

To facilitate transmission of orders to the master 350, orders are batched by the terminal in groups of 15 or less as specified by the operator entering an "end-of-batch" indicator. These batches are used to create hash totals which are in turn used to verify complete transmission at the master terminal, he added.

Operators at each terminal enter the products they receive and this data, combined with the shipment reports, give each location a complete inventory. Each terminal is equipped with a printer which is used to print reports including all shipments for the day, all receipts for the day, all allocations for the day, tank inventories and products shipped by product group for the day.

The terminals can also inquire into each record area for response to customer questions and for management evaluation, Wessell said. Division management can know the amounts of each product available at each location and effectively schedule sales and deliveries, he indicated.

The terminal that provides all this information includes 16K of memory, one-half million characters of storage on dual flexible disks, and an 80 char./sec bidirectional matrix printer. Ashland Oil looked at six remote job entry terminals in evaluating the project, with Sycor winning out over the others, Wessell stated.

Ashland computer science group used some innovative program modifications to enhance the operation of its network, he said. They used the overlay capabilities extensively rather than separate programs to load the 18 functions on the terminals.

To speed file search activities at the remote locations, they grouped eight customer identification numbers in one record, then created a disk address index of the records cutting average access time from 90 seconds to 10 seconds. Still not satisfied, they created a second index and reduced the average search time from 10 seconds to five, he said.

Initially they created the master diskette for each location at the headquarters allowing each location to update the master after installation.

"We want to keep the system standard except for some slight modifications," Wessell said. "No more 22 varieties of data coming in for billing. We now get a stable form and quality of information that benefits the company."

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## At Dresser Industries

# Single Terminal Combines Dual User Applications

ALEXANDRIA, La. — When Dresser Industries began consolidating its computer operations several years ago, Richard Womach began to create a distributed processing system using both on-line and remote processing terminals to handle his division's inventory control problems.

Three years later, Womach, manager of information services for the company's Industrial Valve Division, and his Alexandria Information Management System (Aims) have already hit their three target objectives.

Using the Data 100 Model 82 remote display system, Aims has provided increased control of the company's inventory of more than 55,000 parts, yielded a threefold improvement in the operation of manufacturing systems and maintained modest manpower increases in an operation which has experienced significant growth in output volume, Womach said.

### Card Bound

In 1973 when Womach transferred from the corporation's Maryland division, there was no such system. An 80-character-bound, card-oriented IBM 360/20 was doing financial applications but was not "addressing itself to the real needs of the company," Womach noted.

"There was no automated material requirements planning system," he said, "and the manually maintained records could not keep pace with the problems of managing the relationships among a 200,000 item bill-of-material — problems only magnified by material shortages and extended vendor lead times."

Those problems, exacerbated by a Cardex system to handle 50,000 inventory transaction cards, put the Alexandria division at least a month behind in figuring out where it should have been and more than two months behind in producing customer acknowledgments.

To make more effective use of Dresser's computer horsepower (IBM 370/155 and 165), Womach selected a Data 100 Model 78 systems processor which was capable of handling tape and communicating with the mainframes, as well as handling the future volumes of data Dresser anticipated.

To build the data base stored on the company's computers in Pittsburgh, as well as continue with the everyday operations — a process which took nearly 18 months — Womach assembled a battery of IBM 3741s to enter the parts master file, bill of materials, 25,000 routing assignments, 4,000 manufacturing orders, 8,000 purchase orders and 45,000 customer orders.

The data was then converted by a diskette reader to 9-track, 800 bit/in. magnetic tape and hung onto the Model 78 for transmission at 9,600 bit/sec to Pittsburgh for processing and storage. Hard-copy reports were provided by the Model 78s, 125 and 600 line/min printers.

### CRTs for Updating

With the initial application in place, Womach began to install IBM 3270 CRT terminals in the user areas to access and update the manufacturing files resident on the CPU.

This was done, he explained, not only to cut down on the growing mounds of paperwork, but to make the system as responsive to the user as possible. Forms which were previously handwritten and then keypunched and submitted to the job queue were now key-entered on the CRTs and transmitted directly to the mainframe, which updated the files every four hours.

After nearly 18 months of experience with the 3270s, however, Womach began to recognize the single function limitations of his on-line data acquisition system, and, once again, opted for Data 100 — this time its 3270-compatible Model 82 remote display system and an eight-station Keybatch system. "When the 3270's weren't being used for inquiry," Womach noted, "they just plain weren't being used."

The advantage of the new system, Womach said, is its multifunction capabilities. When the Model 82 is not being used for on-line inquiry or data acquisition, he noted, it is handling off-line data entry tasks in conjunction with either the Model 78 or the 5M-byte Keybatch system. Peripherals, including 600- and 125 line/-min printers, are likewise shared among the three systems, in effect, lowering the cost of the overall system.

"Having the same piece of equipment doing multiple functions," he said, "with multiple backup is a real boon to users at our various terminal locations." The end-users, apparently share Womach's enthusiasm; since the on-line network was initiated, the number of transactions has risen from 6,000 a month to more than 100,000 per month presently.

"With our on-line system," Womach said, "we now know immediately if we have a problem with deliveries — whether coming into or leaving the factory — and that has helped us control our inventory and maximize our efficiency." The improved visibility — never more than four hours old — has also allowed Dresser to schedule production in the proper priority sequence to balance stocks and improve the flow of work on the assembly floor on a continuous basis.

### Better DP Coverage

Judged against a corporate checklist for manufacturing systems which specifies 12 items — from engineering and production data control, to capacity planning, to the order entry procesing, to purchasing — which Dresser believes is the best possible DP coverage, Alexandria scored an 87% performance rating vs less than 30% before Aims.

### No Increase in Staff

Another big advantage to the system, Womach noted, was that while the number and sophistication of applications have increased tenfold, and sales revenue for the Louisiana division has doubled in the past three years, the number of people needed to maintain the records has increased only 19%.

With all of his equipment in place, Womach is now taking aim at a sophisticated "pass-through" network which would store the most commonly used data locally while maintaining the balance of the data base at the CPU.

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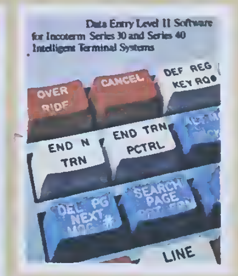
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# Microprocessors Will Foster More Intelligent CRTs

By Barry Kelman
Special to Computerworld

Microprocessors are rapidly replacing hard-wired logic as a means for control in interactive and editing terminals. Micros are even replacing minicomputers as controllers for intelligent terminals. Ever since microcomputer-based CRT terminals were introduced there has been a steady stream of new micro products into this area.

Three types of CRT terminals currently exist in the industry: interactive, editing and intelligent. Each type of terminal fulfills a distinct set of user requirements.

The interactive terminal is most frequently used in time-sharing or conversational situations, an environment requiring frequent access to data for inquiry or addition. Since the data is not processed, there is no need to hold the information for massaging or updating.

In applications requiring minimal amounts of processing along with editing and update capabilities, the editing terminal is more practical. Due to their increased storage capability, editing terminals allow the remote user to access and update information.

An intelligent terminal is basically defined as one which allows the user to program the terminal. Some intelligent terminals allow only remote job entry, requiring the programs to be loaded from the host computer. Other intelligent terminals allow the user to program, test and compile at the terminal. As long as the processing is performed by the terminal itself, that terminal is intelligent.

## True Intelligence

With the use of microprocessors in all three types of terminals, even the most basic "dumb" terminals have intelligence. Micros can be found performing quite sophisticated multitasking terminal control operations. But these terminals cannot be considered "intelligent" in the traditional sense of the word. This intelligence is used to perform a fixed task and is not user-programmable.

This new source of intelligence in computer terminals is not available to the end user: it is not programmable.

Additional hardware and an appreciable amount of memory would be necessary in the interactive and editing terminals for the microprocessor's intelligence to become available to the user. Read-only memory (ROM) can be more expensive than the CPU.

A more complicated screen interface and keyboard than are now found in nonintelligent terminals would also be necesary to make these terminals programmable. And the costs of all these improvements would be self-defeating.

It would be impractical to upgrade an interactive terminal to an editing or intelligent version as user needs change. Replacing logic board arrangements, keyboards and option selection hardware are involved. By the time the user upgraded these components, the terminal's entire electronic package would have been replaced.

Certainly, the microprocessor-based terminal trend will continue. The benefits of this advanced technology are numerous, especially at the system design and programming levels.

System designers and programmers are finding that many capabilities formerly offered as "pay-extra" options are now included in the basic purchase price of the terminal.

Terminal software is becoming more sophisticated. The system designer and programmer are finding their jobs much easier.

*Kelman is manager of software development, Perkin-Elmer Data Systems, Terminal Division, Randolph, N.J.*

# Mo-Pac Freight Cars Tracked Through Memorex CRT Net

*(Continued from Page S/2)*

matching empty car supply with demand.

By maintaining an up-to-the-minute inventory of the current supply and demand for empty cars, the mainframe assists in making visible the car distribution plan and in communicating distribution decisions to yard offices. Upon receipt of reports of empty cars, the 370 scans the list of outstanding orders for cars to find appropriate ones for the assignment.

One of the ways that TCS has reduced the costs of running the railroad has been a 10% to 20% reduction of the time that "foreign" cars (those of other railroads) spend on Mo-Pac rails, he indicated.

"We receive foreign cars at an interchange point and we may take them to the other end of the system to another interchange point. The faster we can move these cars back to the owner the better, since we are charged a rental rate based upon each car's value," Brennan explained.

Another advantage of the system has been an increase in cash flow, he said. The TCS's autobill feature makes it easier and faster for the railroad to produce shipping documents.

**Railroad's transportation center answers customer questions using CRTs to access shipment records.**

Here, 20 of the display terminals are used in the regional accounting office. Other Memorex units are scattered throughout the headquarters building for use in inquiry, administrative message switching and management and control of piggybacks (truck trailers) on the railroad.

The Memorex stations were gradually installed in the facility over several months, replacing about the same number of similar display stations from another vendor.

"The predecessor CRTs, which we had purchased, were sold to a broker. That money covered the cost of the Memorex 1377s. The bottom line of the transaction was our obtaining a better and newer station for no cost," Brennan claimed.

"We considered several plug-compatible display stations. Crispness and quality of the display, feel of the keyboard, maintainability and price were among the main factors we weighed," he added.

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## Connected to CDC Mainframes

# Multi-Vendor Terminals Help Design Nuclear Plants

**By Mal Stiefel**
Special to Computerworld

SOUTHBORO, Mass. — Yankee Atomic, designer of nuclear power plants for its parent New England Electric System, combines on-line and remote batch terminals (RBTs) tied to Control Data Corp. 6600 and 7600 computers on the Cybernet timesharing network to serve its engineering staff.

The system, including four Digital Equipment Corp. LA36 Decwriter terminals, eight Teleterm 1030 portable terminals made by Computer Devices and two Harris Data Communication RBTs — a Cope 1200 and a Model 1620 — supports such applications as core and reactor design, nuclear fuel management, safety analysis and structural design.

The system is also used for radiation analysis, based on readings taken from badges worn by all workers at half a dozen New England Electric nuclear power plants.

The 1620 RBT is used in dual Hasp emulation mode. It is connected all day long to Cybernet centers in Rockville, Md., and in Minneapolis over 9,600 bit/sec lines. When the operator enters a job through the 1620, he designates which computer to use and the terminal places the data on the proper line.

The Hasp protocol, acquired three months ago, replaced a UT-200 emulation package. With Hasp, data compression is improved and two RBT peripherals can be used for output at once, according to company spokesman John Vossahlik.

Under UT-200 emulation, only one output device could be addresed at a time, Vossahlik pointed out. Thus, if one job required output to be routed to the Calcomp 936 drum plotter tied to the 1620, and the following job required a printout on the 1620, the printout would wait until special characters inserted in the data stream by the host computer signaled the end of the plotting job.

Alternatively, in the present system, two printing jobs can run at once, since the 1620 configuration includes two line printers.

With Hasp, the data streams for the two local output devices are interleaved, Vossahlik continued.

Both Hasp and UT-200 support interleaved communication to two different computers from the 1620 terminal.

### Speedy Delivery

Some interactive terminals are located in engineering offices in Westboro,. about a mile from the RBTs in Southboro, and in other Yankee Atomic facilities. Since output for most jobs that originate at the interactive stations is sent to the RBTs, a courier service connects the Westboro and Southboro plants to speed delivery of output to users.

In addition, an edit routine allows the user to send selected critical details or summary statistics back to his own interactive terminal for a "quick look," while the bulk of the output is sent to the RBT.

The interactive terminals, operating at 30 char./sec, can't absorb masses of data, Vossahlik explained.

Several years ago, before the terminals appeared, Yankee Atomic employed students to bring job decks from its Boston office to CDC's public terminal in Cambridge. The first in-house terminal, shared with the parent company, was a 2,000 bit/sec UT-200. It was quickly outstripped, so Yankee Atomic replaced it with the Cope 1200 in 1973.

Again the demands on the system grew. The company considered bringing a computer in-house but decided against it. Management felt the company couldn't risk failing to meet deadlines for critical reports because of a computer outage. So they brought in a CDC 734 RBT in 1975, running with a 4,800 bit/sec dial-up line to beef up the installation; the Cope 1200 stayed on.

Unfortunately, the 734 "couldn't take the beating," Vossahlik said. A Data 100 terminal was considered briefly before the company turned back to Harris last year for the 1620.

Over time, the 1620 has taken on additional core — 65K bytes in all — communication hardware, the plotter and a tape drive to reach its present capability level.

To round out the system, the interactive terminals were acquired 18 months ago, when the RBTs were moved to Southboro from the Westboro plant.

### Nuclear Advisor

Yankee Atomic plays several roles as a service organization supporting the parent company, New England Electric System, and its constituent utilities: New England Electric Co., Northeast Utilities and others.

Yankee Atomic is primarily responsible for nuclear power plant engineering; it also operates the nuclear power plant in Rowe, Mass., and it assists and advises the operators of other nuclear plants in New England.

The company's responsibilities in power plant engineering include development of requirements, environmental studies and the furnishing of data to the federal government's Nuclear Regulatory Commission, Vossahlik said.

Thus, as a contractor like Westinghouse, General Electric or Combustion Engineering develops plans for a plant, Yankee Atomic will look over its shoulder, checking calculations, using independent methods to verify the contractor's design.

Several software packages are used on the Cybernet network in these computations. For example, the PDQ program, part of the Lifetime Evaluation and Analysis of Heterogeneous Systems package, is applied in core and reactor design and in establishing initial fuel loading for the plant.

Structural analysis is carried out with Stardyne, an engineering package.

The Relap-4 and Loca programs are used to determine whether safety devices will protect the plant, personnel and the surrounding community in the event of an accident, Vossahlik said.

The radiation analysis system, developed in-house, includes a data base of cumulative lifetime radiation of individuals employed in the nuclear plants, he added.

*Mal Stiefel is a staff member at the Mitre Corp., Bedford, Mass.*

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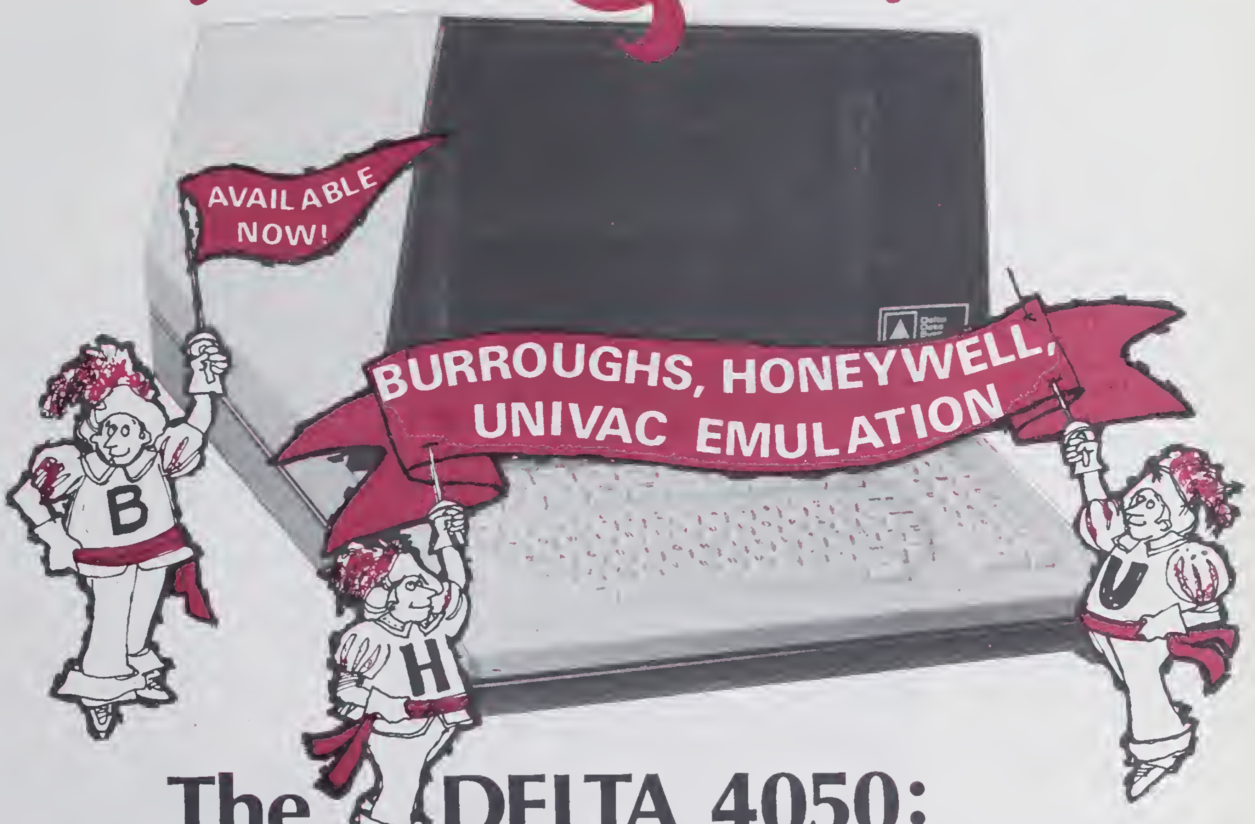

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# Intelligent Terminals Impact Multiple Applications. . .

The trend with today's data communications terminals clearly is from dumb terminals to intelligent and from a single medium to multimedia.

Terminals are growing in intelligence and function, increasingly guiding users when they input data, editing transactions and storing data at the terminal. Many of today's terminals have integrated communications control and network interface capabilities to peform tasks which were previously done by separate components.

New terminals can be both multiapplication and special-purpose. The current crop of Electronic Funds Transfer terminals are highly special-purpose and are usable for little else. At the same time, general-purpose CRTs with printers can, through their intelligence, perform a wide variety of functions programmable by the end user and serve both specialized and generalized applications.

Terminals are increasingly modular. Users can buy plug-in circuit boards to increase the function or capacity of the device or expand its media. They can select sensed, keyed, verbal and/or scanned data entry and can have displayed, voice printer and/or facsimile output.

The cost of terminals is decreasing. Basic terminal elements (e.g., casing, power supply, display) account for a major proportion of terminal manufacturing costs today. Unit costs are fairly stable, ranging from under $1,000 to $5,000 depending on capability.

The cost of an intelligent terminal is rapidly approaching that of a dumb one. The electronics (logic, memory) don't add much cost to the device. Consequently, newer terminals give users more "smarts" for the same dollar.

Terminals are becoming a rising and more obvious portion of total system costs as the number in use grows and as other system components, such as the central processor — that big machine back at the home office — drop in cost more rapidly.

There are three major implications of the technological trends affecting terminals.

First, planners and users of terminals should deploy more capability at the terminal level. That's almost a truism today, but it is backed by solid benefits, including lower network costs, less reliance on a central computer and higher reliability.

Second, users should isolate changeable functions (such as formats, input data that is dynamic and not absolutely fixed) in programmable read-only memory, if they are using that type of device, or in functionally discrete software modules.

More importantly, users should invest now for future flexibility. New uses will be developed for the terminal after the immediate objectives are attained.

Furthermore, an intelligent terminal is unlikely to impact only one application area. Work flows and communications patterns will change, generating new applications such as word processing. If users plan ahead for flexibility, they may be able to "piggyback" new uses on the devices they install now by adding modules instead of replacing devices.

In addition, terminals may need to share networks with nondata applications. Perhaps the terminal itself may be used for or act as a controller for such nondata as electronic mail or facsimile transmissions.

### Transmission Techniques

With transmission links (the "wires") the trend is from private (or leased line) to public (switched or shared lines) and from analog to digital transmission techniques. Many new services will use digital transmission technology and the market will support a number of shared, public networks.

For example, users can choose between Bell's Digital Data Service and Southern Pacific's Datadial (based on Datran's original service). In addition, private microwave nets are being set up by large users or by users with a high volume of data to transmit from one building to another.

The packet and specialized message-switching services, such as Telenet or AT&T's Transaction Network Service, are another proven and growing area of communications.

Satellites are increasingly being used by commercial users who now can lease fixed "lines" through Westar and others and will soon be able to share demand assigned circuit capacity from several vendors as well as the new Satellite Business Systems venture.

Higher bandwidths and faster speeds characterize the trend.

Integrated switching disbursed throughout the network and fast connection times for switched (shared) services are also in the offing. Today, for example, Telenet and Tymnet can, from the time the last destination characters are received at a node, establish a path to the destination within 300 msec in most cases. That's fast switching. This kind of speed makes switched services viable alternatives to private-line networks.

Use of networks is changing. Where in the past the usage profile on communications lines tended to be continuous, now it is becoming more erratic and sharply

*(Continued on Page S/11)*

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# . . .Providing Users With More Equipment Flexibility

*(Continued from Page S/8)*

spiked. The reason is that there is a lot of interaction between the operator and the system occurring at the terminal.

Then, at some point, the terminal accumulates a block of information and wants to transmit it or it needs to "talk" to somebody else (another terminal or a computer), resulting in a burst of exchange between the terminal and the remote point, usually at high speed. This sequence is followed by more continuous interaction between the operator and the terminal, another burst exchange and so on.

The cost of transmission is declining, but much more slowly than other components of the system. The costs are becoming usage sensitive (such as recent and proposed Wats tariff changes) and distance insensitive (in private-line services as well as Wats).

While costs have dropped, recent and proposed changes (Telpak elimination, revised individual private-line rates and Wats restructuring) have shaken the foundation of transmission and made it necessary to rethink the entire approach. As a result, communications link costs are becoming a larger, more visible and much more critical portion of total system costs.

One of the implications of these trends in transmission links is that a wider variety of options need to be evaluated. In addition, dedicated application and network communications links tend to be inefficient and thus costly so they will be less prevalent in the future, especially since the electronics needed to control shared use systems is dropping in price so dramatically.

Planners need to build in enough flexibility to interface several transmission services with varying protocols and varying speeds. This is technically feasible today using intelligent interfaces.

Planners should consider shared systems or shared links for developing "bursty" applications.

The trends in network architecture and protocols include the following:

Star networks are phasing out. They cost too much and expose the entire network to failure of a critical component. This centralized architecture doesn't conform to the way businesses want to organize and run their information systems.

There is a tendency toward ring networks, such as onsite rings or digital loops, with IBM's logical loop interface as an example, or offsite rings, such as the packet services — some large-scale users are building their own packet rings where they have several processors to link together.

There is also a trend toward hierarchical networks and, of course, hybrids.

More and more users are interested in high-level, unified communications network architectures such as Honeywell's Distributed Systems Environment, IBM's SNA and Digital Equipment's Decnet. Control protocols are becoming standardized. For example:

- The packet protocol seems to be favored by advanced users and for good reasons. There are some inefficiencies involved but the standard interface discipline it imposes more than offsets any inefficiencies or extra costs. The international standard X.25 is the protocol the world appears to be settling on.
- There are specific high-level data link controls such as Synchronous Data Link Control, High-Level Data Link Control and Burroughs Data Link Control. People are beginning to use them, but usually only when needed to use a desired terminal.
- Of course Bisync will be with us for some time to come, so networks of links and processors will need to interface various protocols. For example, most large organizations will have a line that has a Bisync terminal on it and will want to plug it into a larger network that is basically a packetized ring network.

There are several implications of these trends in terminal network architecture and protocols.

First, users should separate the communications networking functions from applications characteristics. Users probably should dedicate a set of processors to network functions — don't let the applications get mixed up in them.

Users should integrate separate networks to reduce the redundancy of communications facilities throughout the organization. To do this, the network should support a variety of processors and terminals operating diverse applications.

Users should plan to provide a rich variety of services and service levels within the network to create a single service with multiple potential uses. This serves the dual purposes of economy and maximizing the possible communications paths to foster a freeflowing interchange of information.

Lastly, users should maximize architectural and protocol compatibility to make all this diversity work together. One way to manage diversity and change is to set up a generalized network with increasing application specificity accomplished through hierarchical layers of terminal hardware and control protocols.

*This article was based on a recent presentation by staff members of the consulting firm of Booz, Allen & Hamilton, Inc., New York.*

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*Jim Millington, Project Manager*
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"OPTICOM—which includes the Sycor 440—is the most cost-efficient way we've found for handling heavy volumes of title actions." Millington explains.

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# Optimal Terminal Selection Process Held Vital For Efficient Network

By Dr. Howard Frank
Special to Computerworld

Data communications systems are playing an ever increasing role in today's corporate and government environments. Network planners are beginning to realize the importance of overall planning and design of these systems.

There is increasing acceptance of the network planning process which involves such steps as problem definition, requirements analysis, feasibility studies, technical strategy evaluation, analysis, design and simulation, system specification, acceptance testing and operations and maintenance. However, few users realize the importance of including terminal selection within this planning environment.

The goal of the data communications manager is to provide the most cost-effective system which meets the needs of users. In fulfilling this goal, the manager generally attempts to integrate various aspects of the system.

Network integration may occur at a number of conceptually distinct levels. For example, sharing of common carrier facilities by multiple users on FX lines, Wats lines and so on are readily used approaches. Until the recent Telpak tariff elimination, large users were able to make efficient use of a tariff structure to integrate their communication requirements.

A more detailed level of sharing involves the use of common functional communications devices and their associated communication lines. Examples of such devices are concentrators, message switching processors and packet switching nodes.

Another approach toward integration is the sharing of multiplex facilities and their lines. This sharing is often very effective in reducing network costs.

At a more detailed level of integration, there is sharing of ports, modems, terminal controllers, the terminals themselves, space and staff for facilities and the sharing of application programs and computing resources.

### Integrated Functions

An alternative approach to sharing is the integration of the planning and management functions across the entire spectrum of data communication activities. Via centralized management, cost savings can be realized from discounts available for bulk purchases, the overhead associated with procurement, billing, facilities maintenance and recordkeeping can be reduced, and sufficient technical expertise can be amassed in one place to plan properly.

In this area, the selection of proper terminals, combined with the design of the communication system can also make a major impact. To illustrate this point, the following example is taken from a real-life situation.

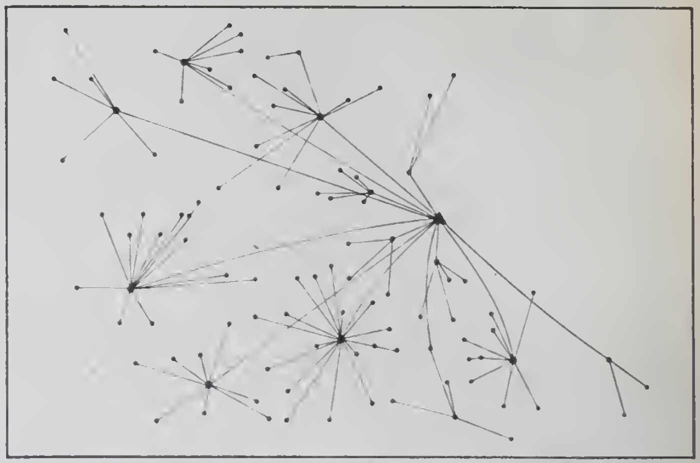
The system considered is a time-sharing network which was developed to provide services to approximately 1,000 terminals distributed over a wide geographic area. The system had been designed in two stages.

A communications network was developed based on the use of multiplexers distributed remotely from the central time-sharing computer. Users would access the central computer by dialing in to the nearest multiplexer using in-Wats or FX lines. The selection and payment for terminals was left to the end user.

The result of this partition was that virtually without exception, users chose the least expensive terminal which could be employed within the system. This terminal invariably was a simple low-speed (non-CRT) printing terminal. The fragmentation of the planning and design problem thus led to a system which had a generally low-cost terminal population, but a high-cost communication network.

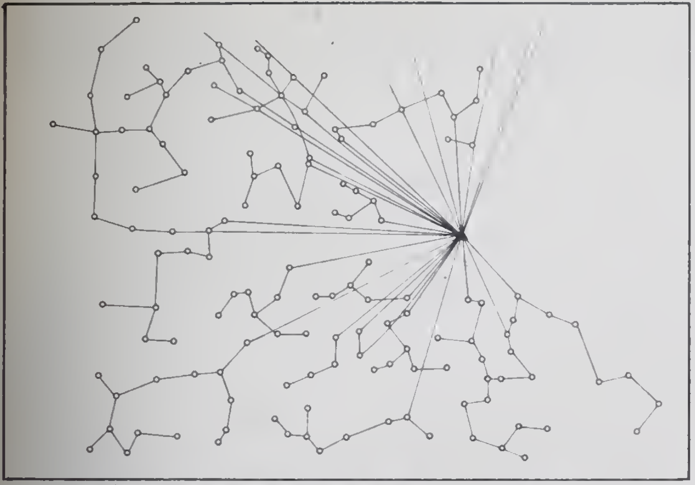
Unfortunately, after implementation of service, users began to experience dissatisfaction with the speed and quality of their ter-

*(Continued on Page S/13)*



**A section of a multiplexed network with low cost terminals and a high cost communication network.**

# Networks Depend on Terminal Selection



**A section of the optimized multidropped network architecture.**

*(Continued from Page S/12)*

minals and began to upgrade to high-speed devices. Within less than a year of operation, it became apparent that many of the low-cost terminals would shortly be replaced by higher speed CRT devices. The resulting trend was toward a high-cost terminal population with the high-cost communication network that had been developed to serve the more primitive terminal population.

The alternative to the above situation was one in which the communication network planner selected both the terminal and the network design. An optimization study led to a number of interesting conclusions about the best communication network structure and the proper management structure within which to make planning and purchasing decisions.

This study considered the uses of alternative communication techniques for serving the time-sharing terminals. In particular, the study considered the use of multidrop communication lines with higher speed, buffered terminals sharing these lines.

The conclusion reached was striking. If the network planner had control of the terminal selection as well as control of the network, an entirely different network architecture and terminal selection would have been made. With this different architecture, the planner would have been able to achieve, for the same cost, a system with high-speed terminals instead of one with low-speed terminals.

To achieve this, several decisions would have been made. The terminals selected for the current system were Model 35 teletypewriters with speeds of 10 char/sec. These terminals are not capable of responding in a polling environment. In order to operate in a multipoint environment, the terminals must be upgraded by adding buffering and addressing capabilities and their modems must have higher speeds.

An alternative would have been to make a different terminal selection (e.g., buffered CRT devices) at the beginning of the network planning process. For this selection to be cost-effective, either the incremental cost of the terminal must be offset by the communication cost savings derived from the multipoint configuration or the users must be willing to pay for the greater capabilities of the new terminal.

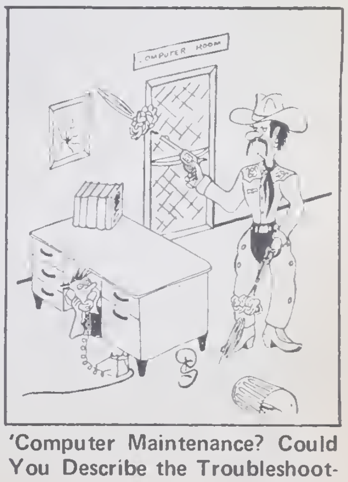
The total cost of the terminals with greater capabilities would have been met by the savings achieved by the multipoint network as compared with the multiplexer system.

Based on the existing system constraints, the communications cost for an optimized multiplexer system was about $50,000/mo. The multipoint line configuration reduced the communications costs by about 50% or $25,000/mo. Moreover, projections of future traffic requirements increased the absolute savings of the multipoint versus the multiplexer approaches to over $38,000/mo.

These savings, when equated to the potential dollar pool available for terminal enhancement via either capital expense or lease, generates an amount greater than $1.5 million. This pool would amply cover the cost of the terminal enhancement, thus providing substantially greater terminal capability with no additional total system cost.

This example is typical of many systems. It illustrates the benefits of a comprehensive network planning process which includes in its domain all elements of the system ranging over the user terminals, the communication network and the host computer.

*Howard Frank is president of Network Analysis Corp., Glen Cove, N.Y. 11542.*



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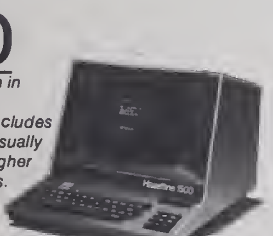

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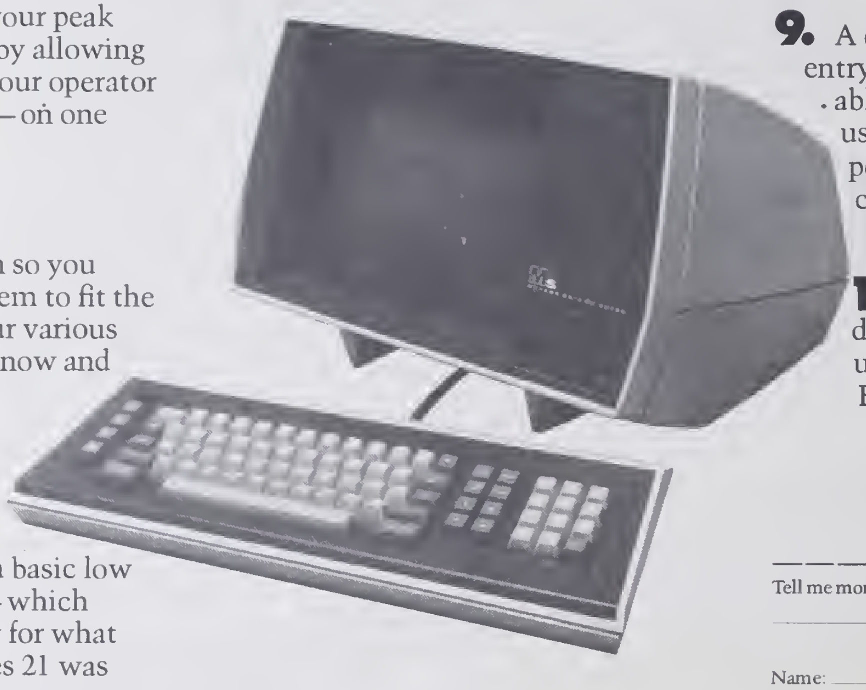

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# Off-Line Terminals Handle Chilton Subscriber Data

RADNOR, Pa. — By 3 a.m. on the morning after each of the three Presidential debates, an IBM 370/145 here had processed the results of nationwide voter opinion surveys conducted by Chilton Research Services, a division of Chilton Co.

The surveys were among more than 300 Chilton completed last year for clients in business and government. Like most of those surveys, the opinion polls which followed the Ford-Carter debates were conducted by telephone.

"We have more than 40 IBM 3277 CRT terminals connected directly to our computer," explained James Wyatt, operations manager for Chilton's Management Information Service's department. "Typically, our interviewers enter response data directly into those terminals during phone conversations, prompted by messages displayed on their terminal screens," he said.

"Because of the need for fast turnaround, we employed more than 100 interviewers to sample the reactions of voters throughout the country immediately after each debate. We did not have enough terminals to use the on-line system," he noted.

Instead, interview results were prepared for the computer on an Inforex 3300 terminal system, according to Wyatt. "That's a good example of the way the 3300 supplements our on-line system," he said, "not only for our market research operation, but for other applications as well."

### Uses Microprocessors

The 3300 includes a terminal control unit which employs microprocessors for the validation of entered data. The control unit can accommodate as many as 16 CRT stations, each with a keyboard and visual display device.

The 3300 system is used for applications that do not have to be entered immediately into the CPU. The 3300 controller is programmable so that it can be modified for various applications, Wyatt said. Data entered into the 3300 terminals is batched on the controller tape unit and from there it is manually transferred to one of the eight 3420 IBM tape drives that are connected to the 370/145, he said.

Chilton's system consists of a control unit with 11 terminals, a high-speed printer, 45 in./sec tape drive and a 10M-byte disk drive.

The company keyed a total of more than 7 million records on that system during 1976. The system is used in the Chilton Book Co.; for subscription fulfillment; in handling more than 400,000 "bingo" response cards submitted by readers of Chilton's trade magazines; and for corporate personnel, payroll and other accounting applications, in addition to market research.

"We installed our first Inforex system, a Model 1301 intelligent terminal system, in 1972," Wyatt recalled. "Since then, we've continued to upgrade our installation up through our current 3300. In general, the advantages of the 3300 are that it is easy to program, offers powerful editing capabilities which reduce the need for verification and maintains response times even while it is running several jobs simultaneously," he said.

Chilton selected the 3300, in part, for its data validation capabilities, according to Wyatt; however, "many of our jobs require manipulation of a very large data base. We use CRT terminals on-line to the 370 for those jobs," he said.

For many companies, an on-line system would not be cost-effective, Wyatt noted. "The same was true at Chilton until we put several applications on-line, all of which can share the same major software package. For less complex jobs, or for special requirements such as the Presidential debates, the 3300 system offers an alternative to our on-line system," he said.

Wyatt said Chilton's market research operation, for example, surveyed the attitudes and opinions of more than 1.5 million people during 1976 for commercial, industrial and government clients. The results of more than 700,000 of those interviews entered Chilton's CPU via the 3300.

"The decision whether to to use the on-line terminals or the Inforex CRT equipment depends on the number of persons to be interviewed, the complexity of the questionnaire to be used and whether the survey method will be telephone or hard copy. Normally, the phone interviews are conducted using the on-line terminals, while we use the Inforex CRTs to key hard-copy questionnaires," Wyatt explained.

Chilton uses on-line terminals for subscription fulfillment in its magazine publishing division, but also offers subscription services to other publishers.

The 3300 is used more extensively in the Chilton Book Co., in an order entry application involving some 1,500 active titles as well as new and out-of-stock books.

Approximately 80,000 invoices are generated each year with data keyed from the 3300 CRTs. In addition to the entry of approximately 300 orders per day from wholesalers and retailers, the 3300 is used to update an 8,000-name customer master file and to update the division's master inventory record.

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Multiple CRT terminals are used to enter and retrieve customer information that is stored on a system maintained by National Sharedata Corp.

# Harris CRT Terminals Access Integrated Customer DP Records

OKLAHOMA CITY, Okla. — Increased customer service, reduced waiting times and equipment flexibility are principal reasons why intelligent terminals are being used here in several departments at Liberty National Bank and Trust Co., the largest bank in the state with assets of more than $1 billion.

Using a computerized central information file system on a dual host computer, Liberty National Bank has installed 40 Harris 8170 keyboard/display terminals and four 88 char./sec printers in its commercial loan, credit authorization, stop payment and central information departments.

### Nine Account Areas

Liberty Bank personnel can obtain information on any of its customers in nine areas of activity and display that information simultaneously on the terminal screen. Activity areas include checking, savings, installment loan, mortgage loan, commercial loan, credit card, certificate of deposit and safety deposit box. Personnel also can determine if a customer is a Liberty Bank shareholder.

"This automated system enables us to keep updated files on a bank's thousands of customers and to relate all the customers to various account numbers. Many customers have several accounts and many of the accounts involve different individuals," Jack Hoberecht, vice-president and cashier at Liberty Bank, said.

The Harris terminals, installed in February 1976, are on-line to the Oklahoma City DP center of National Sharedata Corp., a nationwide facilities management company that specializes in providing bank-related DP services. Terminals at Liberty National Bank communicate at 4,800 bit/sec over telephone lines to dual IBM 370/145 computer systems and use National Sharedata's on-line software package known as Solis.

"Because of the programmability of the Harris terminals, we can upgrade to other mainframe compatibility with minor hardware and software modifications to the seven controllers for the 8170 terminals when the time comes," Lelan Nelson, vice-

(Continued on Page S/17)

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# CRTs Access Bank's DP Records

*(Continued from Page S/16)*

president of systems at Liberty Bank, said.

Nelson explained that the bank is emulating IBM 2260 asynchronous terminals, but will upgrade to emulate 3270 binary synchronous terminals within the near future to provide greater capability to the bank.

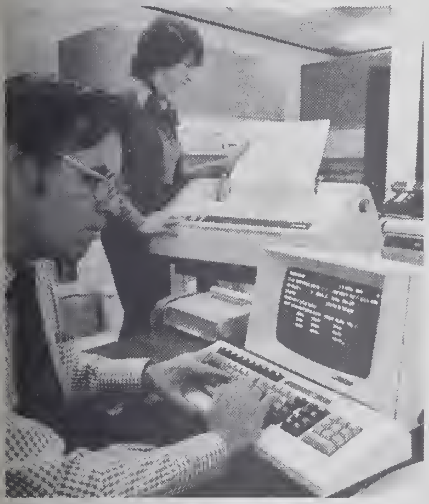
### Account Inquiries

Using 40 terminals, bank employees perform about 4,000 transactions per day, most of them inquiries into the centralized customer account file to respond to questions from departments within the bank, as well as from customers and local merchants.

"The majority of the inquiries involve checking and savings accounts," Ruby Kirkbride, central files officer, said. "A typical savings account record will show the current balance, average balance, projected interest, last year's interest paid and withdrawals for the current quarter. The installment loan information includes the amount of the loan, payment date, current balance, late notices and payoff amount," she said. The balance due on an individual's credit card is also available.

"By having all of this up-to-date information instantly available at the touch of a terminal keyboard, we are able to provide immediate response to all inquiries," Kirkbride said.

Two Harris terminals and a printer are used in the bank's commercial loan department to handle about 1,000 transactions per month involving loans of $25,000 or more, according to William K. Martin, assistant vice-president in that department.



**Commercial loans record department uses Harris 8170 interactive terminals to retrieve information.**

"Any of our loan records is easily available by typing the customer's account on the terminal keyboard. Almost immediately, we can see the credit status, date the account was opened, permanent and temporary historical data and status of three categories of current liabilities — secured, unsecured and indirect," Martin explained.

"Additional information on indirect liability, for instance, can be displayed and would include account numbers, note numbers and percentage of liability for that individual," Martin said. "These can be expanded even further to determine individual accounts, who guarantees the notes and individual customer names, if required.

"Other pertinent data that can be displayed on the terminals includes due dates for customer financial statements, whether a loan is on hold, if the line of credit exceeds the approved amount and if it has expired," he said.

The terminals also are used to add new customers to the bank's central file and to update existing customer files, Martin said. "We are constantly updating our files with new notes, note renewals and note extensions," he said.

Five Harris terminals and one printer also are used in the bank's BankAmericard department to provide instant credit authorization to local and area merchants who call the bank. When calls are received, the user's account number is typed into the computer through the terminal keyboard. Credit information is immediately displayed on the video screen of the terminal and then given to he calling merchant.

To service BankAmericard holders who are visiting from other parts of the country or have had their BankAmericard cards issued by their local bank, Liberty Bank uses a Harris 810 intelligent terminal to access the BankAmericard national network and thus provide local credit authorization as if the cardholder were a local or area resident.

Harris terminals are also used by the bank's personnel to retrieve information on bad, lost or stolen checks and to issue "stop payment" notices for customers.

The dual IBM mainframe computers are equipped with two Periphonic front-end communications processors that link terminals to the mainframe. Other supporting equipment includes 16 large-capacity disk drives, 24 magnetic tape drives, five line printers, and five check reader-sorters.

**Harris terminals installed in the stop-payment department of Liberty National Bank & Trust of Oklahoma City provide access to customer accounts.**

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In the past three months, Raytheon has been busily adding more and more capabilities to its PTS-100 intelligent terminal and PTS/1200 distributed processing systems. The reason: to give you more and more reasons to keep buying Raytheon.

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## 2. Local-Mode Terminals

A long-standing capability of the PTS/1200, and one that only Raytheon offers. It means you can attach up to 16 terminals in local mode to a PTS/1200, at distances up to a mile away. Thus, you get a network in local mode without any TP requirements.

## 3. Teletype Concentration

Announced two months ago, after more than a year of user operation, this unique feature lets you add teleprinters to the same transmission lines as your 3270-type terminals, with maximum performance and data rates preserved. Know anyone else with this $80 a month feature?

## 4. Immediate Deliveries

Raytheon has always been known for prompt delivery. We know that when you need it, you want it. There are five new capabilities described in this ad. All five will be in production by June 30th. This year—1977.

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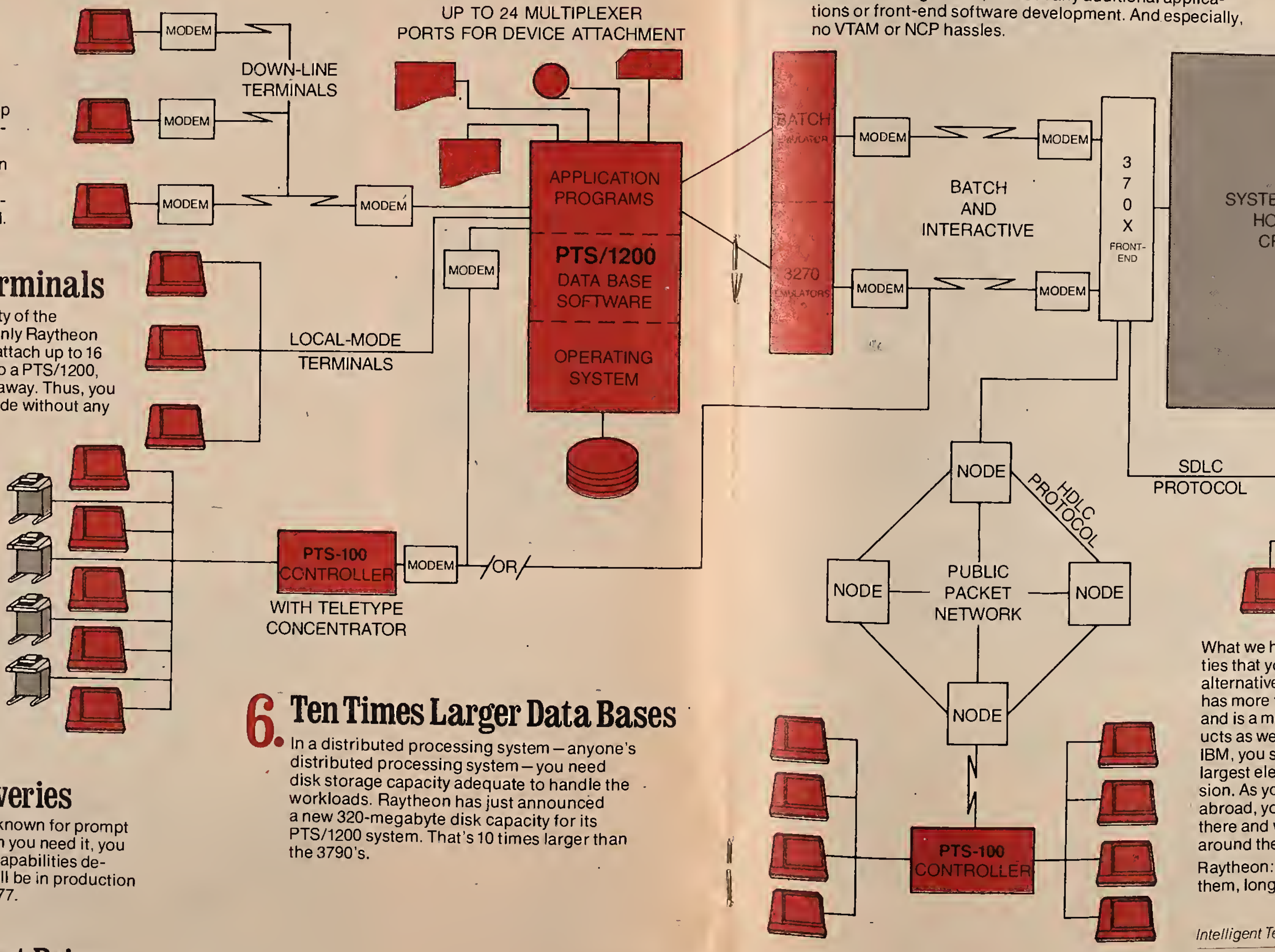

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# Ohio Leads with Law Enforcement Terminal System

COLUMBUS, Ohio — Ohio's acronym for its terminal-based law enforcement system — (Law Enforcement Automated Data System (Leads) — is aptly chosen since the state has been in the forefront of developing systems for public safety over a long period.

Recently, enhancements to Leads became operational making it what is believed to be the largest single site, terminal-based, law enforcement computer installation in the U.S. and possibly the world.

Nearly 800 terminals at remote sites throughout Ohio are now linked via data communications lines to a large-scale Sperry Univac 1100/42 multiprocessor computer system installed in the 41-story state office building here.

Serving the computers is one of the largest disk storage data bases to be found anywhere with a total of 10.24 billion characters of information stored on 80 disk drives.

**Looking over map of 400 terminals in Ohio's Leads police network are (left to right) Staff Lieutenant Eugene R. Howell and Major Ted G. Gentry of the State Highway Patrol.**

In contrast to many states, with separate computers for major departments, the Bureau of Motor Vehicles (BMV) and the State Highway Patrol, both forming part of the Ohio Department of Highway Safety, share the same multiprocessor computer complex and data base.

The State Highway Patrol is responsible for 400 terminals tied in to the system. Sixty of these terminals, Sperry Univac Uniscope 100 visual displays, are installed in 57 highway patrol posts. Another 60 Uniscope 100 units are installed in sheriff's offices and higher traffic volume police departments in the state.

The Uniscope devices are equipped with attached printers allowing hard-copy versions to be produced of any messages appearing on the screen. Another 280 low-speed NCR Model 260 buffered, nonimpact, printer-type terminals are installed in lower volume police departments.

In addition, 125 terminals forming part of computer systems operated by the police forces of Hamilton County (Cincinnati), Cleveland and Toledo also funnel into the Columbus DP center. In the near future, four major cities in Ohio — Columbus, Dayton, Akron and Youngstown — are expected to interface their local computers and have direct links to the Columbus computer center.

For its part, BMV utilizes 25 Uniscope 100 displays at headquarters for administrative purposes and program development and 230 Incoterm display terminals located primarily in remote sites for driver license renewal.

The 1100/42 multiprocessor system consists of two command/-arithmetic units and two input/-ouput units with a combined storage capacity of 458,000 words. In the event one processor should suffer a technical malfunction and "go down" the other processor can automatically take over.

The 1100/42 system is front ended by two communications symbiont processors (C/SP) to handle the high volume of communications flowing into the system. One C/SP supports the real-time network and the other supports demand and on-site peripherals. Each C/SP is capable of handling 96 communication lines.

The 80 disk drives consist of 72 Univac 8440 drives and eight Univac 8433 units. Each drive has an average access time of 30 msec.

Also part of the system are eight Uniservo 20 magnetic tape units, two 0768 printers with a speed of 1,000 lin/min, two 0716 card readers and one 0774 card punch, all from Univac.

Stored in the BMV portion of the data base is pertinent information on 7.9 million drivers' licenses and more than 8 million vehicle registrations in the state. Included in the drivers' license file are records of "points" accumulated by drivers involved in traffic violations.

The State Highway Patrol stores information in the data base on wants and warrants, stolen cars, stolen or lost license plates and vehicles used in felonies.

The system supports a vast complex of communication lines. These consist of four high-speed 4,800 bit/sec data lines going to remote CPUs on the system in Cincinnati, Cleveland, Toledo and BMV; 20 high-speed 2,400 bit/sec lines linking other CPUs and the Uniscope 100 display terminals to Columbus; 28 medium-speed 1,200 bit/sec lines connecting the Incoterm terminals to the system; and 20 low-speed 150 bit/sec lines connecting local police departments using the NCR terminals.

Special communications circuits also connect the system with the

*(Continued on Page S/21)*

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# State Public Safety Agencies Utilize 800 Terminals

(Continued from Page S/20)

FBI's National Crime Information Center (NCIC) in Washington, D.C., and the National Law Enforcement Teletype System (Nlets). Nlets serves more than 4,000 police departments in a nationwide network primarily designed for handling administrative messages.

The Ohio system has a communications network monitor station to provide centralized control of all communications input and output lines.

One of the pioneer states in establishing a computer-based law enforcement system, Ohio started its Leads system using an IBM 360/40 in 1968.

The heavy increase in the volume of traffic on the system necessitated an upgrading to computers operating at higher speeds and with greater backup capacity in the event of equipment failure. As a result, the former State Department of Finance, now the Department of Administrative Services, contracted for a Univac 1106 multiprocessor system in 1973 and then upgraded to the 1100/42 system in 1976.

The 1100/42 system uses Data Management System/1100 (DMS/1100) in conjunction with the Transaction Interface Package (TIP) to facilitate on-line transaction processing including data base accessing.

TIP is an extension of the 1100/42 operating system which provides an interface between a user-written transaction program and the communication complex facilitating transmission to and from remote terminals.

DMS/1100, a data management system, permits a transaction program written in Cobol to access records within the data base in real-time, interactive and remote job entry modes.

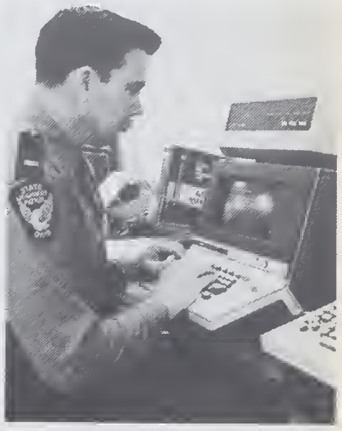
## Law Enforcement Aid

Col. Adam. G. Reiss, superintendent of the Ohio State Highway Patrol, said Leads has been a boon to law enforcement in the state.

"We've made great strides in going from a teletypewriter system to a computer-communications network; now we can have the information in the files available in a matter of seconds rather than days or even weeks as in the past," he said.

"Presently our troopers are averaging 200,000 checks a month through the system to keep on top of the stolen car problem," he added.

"Beyond the highway patrol's own use," he continued, "we've found that city, country and township police forces throughout Ohio are enthusiastic about the system. In order for these organizations to obtain the maximum benefit from the system, we operate an ongoing training program using our troopers. As part of this program, a patrol representative personally contacts each local police department at least once a month. We believe these contacts pay dividends in the long run as correct operation is essential for the maximum effectiveness of the system."



**Ohio State Highway Patrol operator uses Univac 120 Uniscope CRT to access Leads network.**

Major Ted. G. Gentry, in charge of the Bureau of Technical Services of the Highway Patrol, noted that currently the response time for receiving data on a terminal from the computer averages about 3 to 5 seconds vs. 30 seconds before Leads began using higher performance computers.

"Basically the system has improved considerably," Gentry said. "The shorter computer response time was a 'must' for us because of the constantly higher volume of transactions we're handling.

"When we started the Leads upgrade we were averaging about 70,000 transactions daily. By the time we cut over to the new computers in March 1975, we were up to 122,000 transactions daily. Presently we are running at about 175,000 transactions daily," he said.

"We're continually adding more local police departments to the system which in itself adds still further to the volume of messages," he noted.

## Vehicles on File

The motor vehicle registration file contains the name and address of the vehicle owner, vehicle type, model, serial number and current registration information. Vehicles can be traced through inquiry by either registration number or identification number.

The drivers' license file contains information recorded on the individual's license: license number, driving restrictions, name, date of birth, sex, weight, height and color of hair and eyes.

A real-time system for the re-

(Continued on Page S/22)

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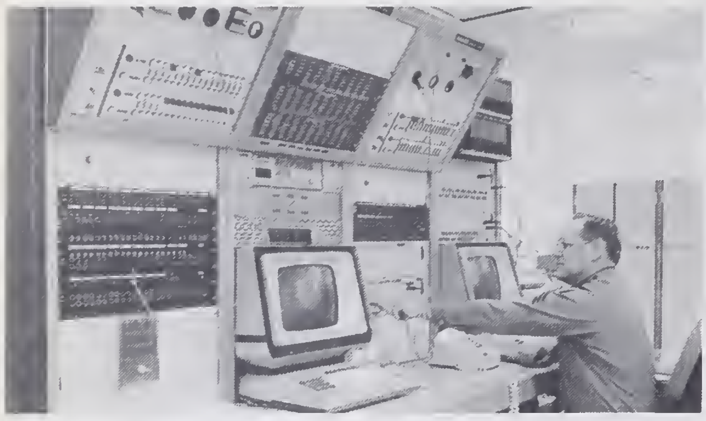
# Highway Patrol, Motor Vehicle Bureau Rely on CRT-Based Enforcement Net



Sergeant Robert L. Worman of the Ohio Highway Patrol operates control monitor which keeps track of data links into Univac 11--/422 multiprocessor system.

*(Continued from Page S/21)*

newal of drivers' licenses in Ohio became operational early in 1976. The new system considerably speeds the updating of information in the computer file.

Applicants renewing their licenses (valid for four years in Ohio) go as usual to the local office of the deputy registrar, the issuing authority in Ohio. Each deputy registrar office now has an Incoterm visual display, an "intelligent" terminal with 4,000 bytes of memory storage, linked to the 1100/42 system in Columbus.

Using the terminal, personnel can make a real-time check with the computer to ascertain that the person applying for license renewal is indeed qualified to drive and isn't under a suspension or revocation.

Previously, according to Donald Cort, assistant deputy director of the division of Computer Services, the license would probably have been renewed even though the person was ineligible because of the time lag in getting information into the centralized system.

Under the old system, Cort said, the information was entered into the computer under a batch program that could take a few days to process and it might be 30- to 60 days before the information from the centralized system could effect a cancellation of the previously issued license.

According to Jerry Hammett, deputy director of the Division of Computer Services, Leads has become a much finer system with substantial enhancements since it began operating under the new multiprocessor system.

### More Reliable

Hammett said the system is faster, quieter and more reliable now. Most of the special software tailored for the state's needs, he explained, was developed by a joint Ohio State-Sperry Univac team.

A major advantage of installing a multiprocessor system, Hammett related, was that the state could dedicate a major portion of it to law enforcement without having to rely on an administrative system as backup because of the redundancy built into the 1100/42 system.

Hammett said plans are currently being formulated for additional use of the Columbus computer complex in law enforcement and criminal justice activities.

"We're looking into the possibility of using these computers for all law enforcement and criminal justice activities including the Bureau of Criminal Investigation, the Department of Corrections, Youth Commission and the State Supreme Court.

### Exceeds Expectations

Summing up the results achieved so far from the system, William G. Christie, data systems administrator for the Department of Highway Safety, commented that the system "is doing more than anybody thought it would.

"It's been our goal for a long time," Christie asserted, "to put all of our records in a common data base and we feel that we've made a good deal of progress down that road."

Looking to the future, Christie plans on adding a real-time motor vehicle registration file to the computer's workload. This would be a system using intelligent terminals for on-line registrations. An obvious benefit would be the timeliness of data being updated. This data would then be the heart of a fiscal accounting, inventory and revenue distribution system for Ohio's 1,157 local taxing districts.

"Ohio has a record," concluded Robert M. Chiaramonte, director of the Ohio Department of Highway Safety, "of being one of the most cost-effective state governments and we're doing everything we can to maintain that reputation by running all of the operations under Highway Safety as efficiently and economically as we can. We believe that computers can play a major role in many of these operations."

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## 'Do-It-Yourself' Units

# Stanford University Sends Homemade Terminals Home

STANFORD, Calif. — Stanford University is getting into the swing of the new home computer boom by providing "build-it-yourself" computer terminals to 50 DP employees and 50 students to use at home.

The terminals give the students and DP personnel access to the school's computer system from the convenience of their homes, offices or classrooms. Moreover, the students and employees assembled the video display terminals themselves from the hobby kits.

The university recently purchased the do-it-yourself ADM-3 Dumb Terminal kits produced by the Data Products Group of the Lear Siegler, Inc. Electronic Instrumentation Division as part of two separate projects to provide additional low-cost I/O devices for the university's computer communications network.

One obvious benefit of the homemade terminals is that they save both groups from running down to the computer center to get their computing work run any time they have jobs to do.

Employees of Stanford's Center for Information Processing (Scip) and students in a special program designated Low Overhead Timesharing Services (Lots) assembled the terminals using only basic tools such as soldering irons, needle-nose pliers, wire cutters and screwdrivers.

The Dumb Terminals — CRTs with keyboards that let users enter data for processing — are so-called because they function simply like "quiet" teletypewriters.

For use at home, Stanford employees needed a compact, lightweight terminal. The Dumb Terminal fit the bill at only 25 pounds. The terminal is 12.5 in. high by 15.5 in. wide by 19 in. deep yet provides a 12-in. screen, measured diagonally. Power consumption for the terminal is 70W.

### Time Savings

An economical answer to the university's terminal needs, the kits also represent a savings in waiting and traveling time by allowing employees to work at home. Some 50 participating Scip employees now have kits permanently assigned to their homes, enabling them to access Stanford's interactive systems any hour of the day or night, without ever stepping outside their front door.

"Having a terminal at home has given me the freedom to work my own hours, which are often late at night and weekends," Richard Guertin, one of the participating employees, said.

"I not only save the gas and time previously spent in extra commuting during predeadline periods, but get my work done faster by avoiding the university's usual interruptions. By working nonstandard hours, I can also avoid the daily traffic jam of programmers awaiting access to the computer," Guertin said.

Stanford University programmers can also utilize computers at other universities for special projects. Prior to home terminal arrangements, programmers needing to communicate with the computer center at the University of Michigan, for instance, were forced to arrive on campus hours earlier than usual to compensate for the time zone difference.

User convenience is only part of the home terminals' benefits.

### Quick Repairs

Program breakdowns occurring after regular working hours can now be corrected in minutes, because the programmer doesn't have to drive anywhere. Immediate input to computer programs is particularly beneficial to employees working with the Stanford University Hospital, where quick repairs can often be crucial to the hospital's operation.

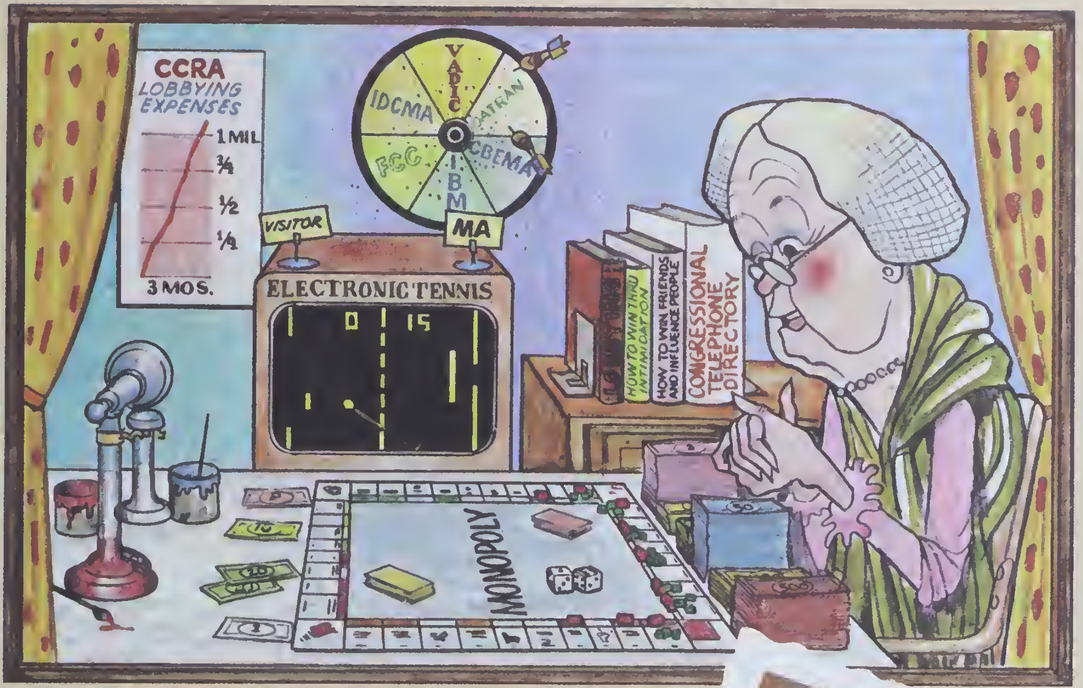
The terminals are connected to the computer center's IBM 370/168 which is also used by Stanford students and researchers.

Lots, the second purchase program, was established by Stanford to provide students with additional facilities for 24-hour cost-effective interactive computing capabilities, using a Digital Equipment Corp. System 20/40.

"Lots was able to supply students with 50% more terminals by choosing the lower priced Dumb Terminal kits over fully assembled models with the same features. The kits were all assembled by students, who are also planning to take on maintenance functions for the 50 terminals," Ralph Gorin, manager of Lots, said.

Lots is open all the time and imposes no time or subject limits on student usage. Previously, students had accounts with dollar equivalents; when the money was gone so were rights to the computer. Students were also restricted to specific course work.

Plans are now being made to install a few terminals in the student dorms so they can also have the opportunity to "work at home."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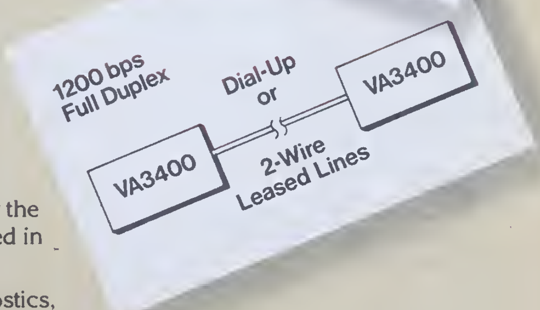

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When it comes to industry "firsts", Ma, Vadic sure hasn't been playing games.

Your independent thinking son,

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PS: Vadic has shipped over 125,000 modems to date.

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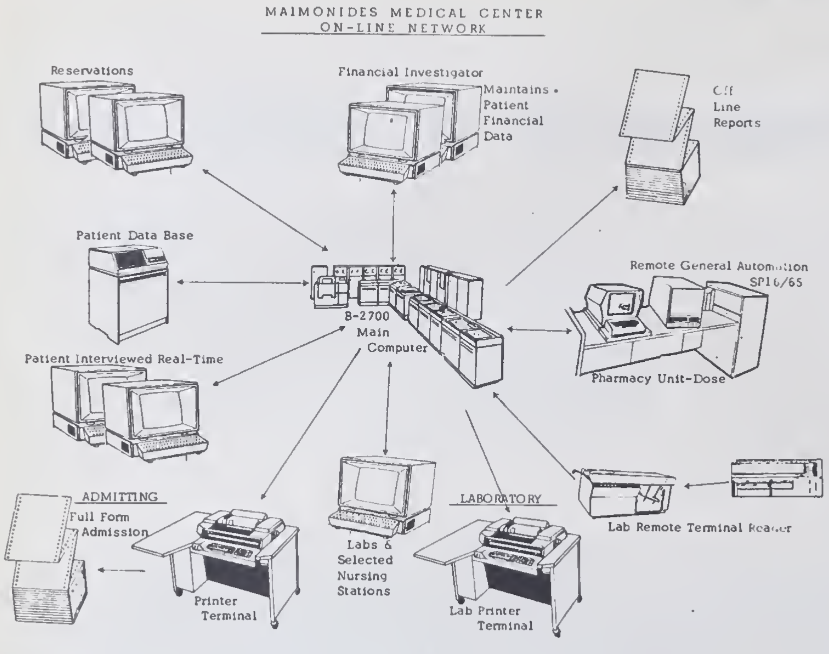
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System diagram of Maimonides on-line financial and medical terminal network.

# Modular Data System Helps Hospital Treat Its Ills . . .

BROOKLYN, N.Y. — When administrators at Maimonides Medical Center here began looking for a way to upgrade the center's computer system to reduce the workload, time and costs associated with patient admissions and reservations, the first place they looked was to their present computer system. Specifically, how could the DP staff improve the efficiency of the Burroughs B-2700, the heart of the system.

The need for centralization of all records was immediately evident as the first step toward achieving these goals. Ideally, the final system configuration would permit terminal access to the entire realm of patient information: medical, sociological and financial. While the sociological and medical portions of a patient's record initially would be accessed only in certain locations within the center, ultimately medical records as well would be available from terminals at nurses' stations on patient care floors.

### Data Network

The present on-line network includes a General Automation SP 16/65 with appropriately connected terminals which is constantly on-line to the Burroughs main computer to handle and control the center's unit-dose system. The laboratory is on-line via modems utilizing a variety of terminal devices also permitting access to patient results at selected points in the medical center. In developing the data network, it was understood that certain existing systems would be blended and others integrated, based upon upgrade potential and the systems life expectancy, plus cost justification.

At the time, the center's primary data collection of patient admissions, transfer, discharge and expirations consisted of a direct connect line from the main computer connected to four vintage video display terminals which were considered underfeatured and inefficient. They had served a valuable purpose and for that period of time in which they were in use, they helped to do a fine job. But as evolution took place and other systems were implemented, such as laboratories, pharmacy unit-dose and enhanced financial reporting, the system and the people just could not keep pace with demands for a faster, more reliable media.

In order to speed up the information exchange and satisfy projected requirements, it was determined that two objectives be accomplished: develop a modular system with a total patient data base structure in mind and keep it human-engineered, which would lend itself to a low learning curve: and select a suitable video display terminal, which would lend itself to a conversation real-time mode, hopefully with Burroughs protocol for CPU compatibilty, competitively priced and full featured.

The first objective was a question of designing a new system, utilizing the power contained within the Burroughs MCP STO-Q and developing program modules which would effectively pass data through a designated STO-Q. The second objective was engaging in the selection of terminals that would do the job effectively, with the least amount of R&D, and maintain reliability. The terminals would be installed at appropriate stations throughout the hospital.

"The problem," according to John Harbison, director of systems & computer operations, "was that we had to find a microprogrammable video display terminal that would not only handle the information exchange between operator/computer/department, but would also be compatible with the Burroughs processor.

### Selecting a Terminal

Four different manufacturers' video display terminals were evaluated for the system. "We eventually decided on the Delta Data Systems Corp. 4050B terminals, mainly because they could most easily fit into the center's existing system, in that not only protocol emulation for the Burroughs processor but also Burroughs terminal emulation is built in," Harbison said.

The Delta terminals at Maimonides are equipped with 2K characters of refresh memory and display 80 columns by 25 lines of upper- and lower-case characters. The display and editing features of the terminal were also considered, Harbision added, because of the many different forms the center's people use regularly.

In meeting the goals set forth in the first objective requirement, Maimonides developed a modular system and gave it the name Financial And Medical Qn-line Unified System (Famous), which officially went on-line at Maimonides on March 1, 1977. The delta video terminals and the Burroughs TC4000 printer form a critical part

(Continued on Page S/25)

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| ENVIRON 1 | 3.1 | 3.1 | 3.2 | 3.1 | 2.3 | 2.5 | 2.5 |
| CICS | 3.1 | 2.8 | 2.4 | 2.8 | 2.8 | 2.9 | 2.8 |
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| IMS/DC | 2.8 | 2.5 | 2.4 | 2.5 | 3.0 | 2.9 | 2.8 |

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*—Ben Driver, Data Base/Data Communications Software Manager, Brockman On-Line Systems (Houston).*

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# . . . By Centralizing Records, And Terminal Access to Files

*(Continued from Page S/24)*

of this first module of the center's network.

The first modules of Famous to be implemented incorporate the admitting department and the financial investigator's office, comprehending on-line reservations, real-time admissions, discharges, transfers and on-line financial follow-up. Since the center maintains a very high occupancy, the time in processing patients is especially critical and must be accomplished swiftly and accurately.

Of the display terminals incorporated in the system, six are currently used in conjunction with one on-line printer with admitting procedures. Presently, there are three display terminals in the financial investigator's office for financial follow-up procedures and reservations, plus one terminal which serves as a backup.

Reservations are handled in the financial investigator's office for elective admissions, via the video terminals in that location. Standard admitting information, including all financial data, diagnosis/operation and tentative requested date of admission, are entered and available for recall at any time.

The system automatically assigns a reservation number which assists in maintaining orderly control. A special report is produced off-line each night providing a reservation register which also shows those patients to be called in for the following day.

The terminals in the financial investigator's office are also utilized to maintain up-to-date financial data on all patients including reservations and thus are always accessible for immediate terminal review.

The patient admissions interview is also handled via video display in a conversational mode, with information being collected and/or updated in real-time via the Burroughs mainframe. Naturally, it is accessible by display terminals in any of the respective areas by authorized users. Upon completion of the admissions interview via CRT, a full-form record of admission is printed via a Burroughs TC4000 terminal, also on-line to the mainframe.

Previously, a total of eight forms had to be filled out for an incoming patient by the admitting interviewer. A messenger then prepared an I.D. plate and bracelet for the patient, as well as additional forms and charts while the patient waited in a reception area. Admissions information was entered onto a display terminal on a time-permitted basis, usually more than an hour after the patient had been admitted.

Third-party notification forms were typed later in the financial department and there was no direct access from this department to admissions information which must be used to determine patient pay status.

Now all forms have been computerized and are either included with the full-form admission record set or are produced off-line at midnight to effectively utilize the systems capability.

Whereas patient information had previously been isolated in separate filing areas, it is now brough together in one central patient file. The present patient profile, which includes information about reservations and admissions, insurance and other hospitalization coverage, has begun helping Maimonides personnel improve cash flow projections and monitor insurance payments more efficiently while cutting down greatly on routine paperwork, according to Donald C. Rizer, the center's director of financial management.

## System Expandability

The capability to handle an almost unlimited number of real-time program modules is limited only to hardware limitations, since the software design ideally lends itself to a modular building block concept. The Famous system has proven itself since the first day of implementation wiht its simple adaptability by users, Rizer said.

Since the center has had the pharmacy unit-dose and laboratory on-line, it was also necessary to integrate the information essential for an eventual total patient data base.

The next stage of expansion will take place in modules to handle the cashiers' functions, including special duty nursing and on-line demand bills; this development is currently under way and will be implemented by September 1. After this, development will continue through the medical areas such as radiology and a more comprehensive inclusion of laboratories and pharmacy.

Certain mainframe hardware upgrades are planned to provide the additional computer power necessary, including a front-end data concentrator with a 50kbit/sec channel to the mainframe; this is planned for the early part of 1978.

**Eva Weill, admitting clerk, operates Delta Data Systems CRT to demonstrate on-line system at Maimonides Hospital.**

MEGADATA's Model 700/UETS
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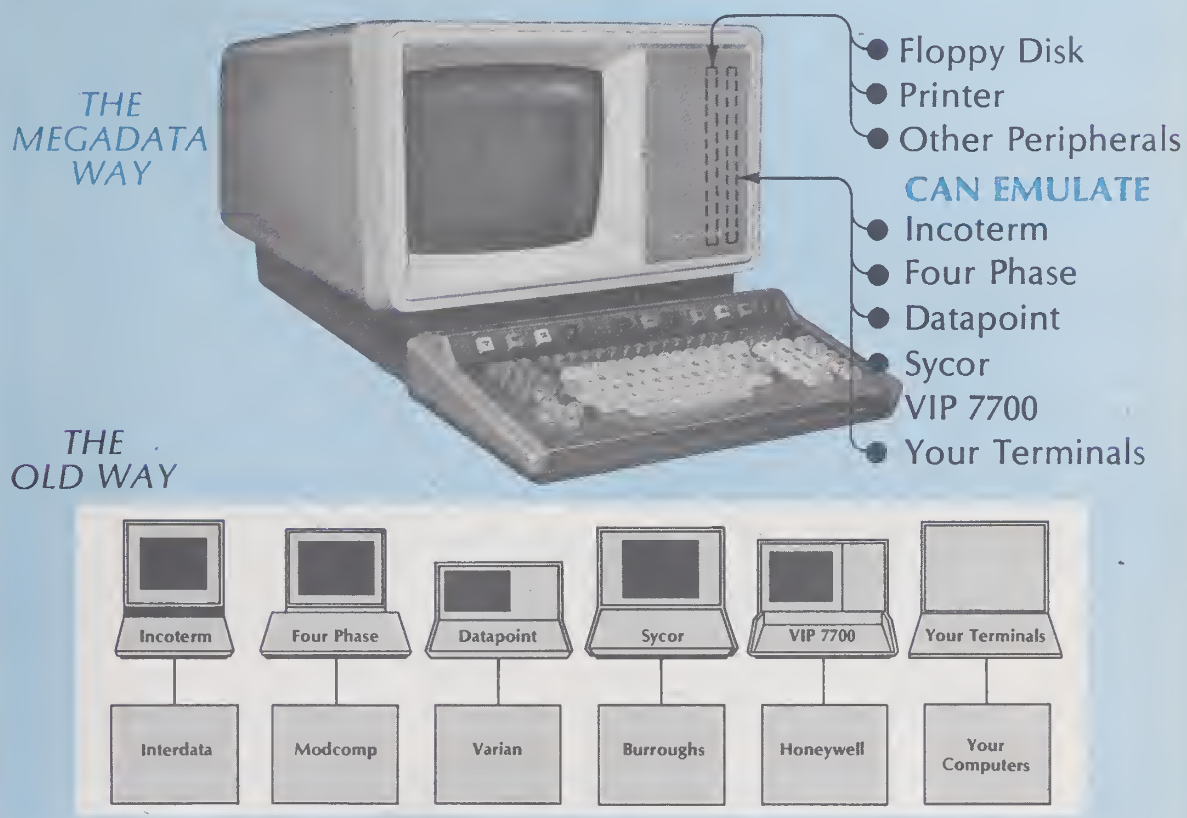

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## For Minneapolis Outfit

# Retail Store Scanners Analyze Sales, Cash Flow

MINNEAPOLIS — "Standing still is going backwards."

That was Sherm Quisberg's comment when asked why he had installed front-end terminals in one of his four Super Valu Stores located here in St. Paul.

"I started getting an exposure to the concept of front-end terminal systems almost five years ago at the Supermarket Institute, but at that time that is all it was — a concept. Yet the potential seemed enormous."

Quisberg, as owner and president of four stores, had his hands full coping with the realities of running his business day-by-day, being competitive and keeping a stable bottom line. There wasn't the time necessary to conduct a meaningful feasibility study of front-end terminal equipment, evaluate their individual merits or determine which (if any) was right for his stores.

He was quick to point out that he relies on the many services provided by Super Valu and it seemed a logical place to elicit research support.

Super Valu had, more than two years previously, initiated an in-depth study of front-end terminal systems under the direction of Paul J. van Helden, senior vice-president of corporate planning and information systems. The purpose of the study was to allow the management of over 1,600 Super Valu Stores to make more informed judgments when considering upgrading to more sophisticated checkout systems.

"I didn't want to revolutionize my checkout systems overnight, but I did want to start with my present system's capability as a low-end starting base," he said.

"I was fortunate," Quisberg added, "to have a man like Al Jensen as store manager of our inner city Minnehaha Mall store, the site of our first installation. He had both an electronics and training background in addition to his retailing management qualifications, having been with Honeywell's Commercial Division as assistant training manager. With the experience we've both gained, my other managers will be ready for electronic front-end systems when their turns come."

Although Super Valu had not yet completed its formal study, it was "leaning" toward the Sperry Univac Accuscan on the basis of numerous critical criteria including system capabilities, upgradability, flexibility, price and a committment to continue to serve the retail community.

Quisberg indicated he had virtually decided to acquire another manufacturer's equipment at that point, but decided to make time to evaluate Accuscan.

It was in August 1976 that Quisberg installed an Accuscan system. At a later date, Super Valu gave its formal endorsement to Accuscan.

### Advance Training

Training of all store management and checker personnel was conducted in-store well in advance of the cutover.

"Our approach to checker training," Jensen said, "was to have our head cashier, Elaine Marchand, along with Univac's Carlene Thissen, conduct the training as a two-part team and it worked beautifully. We sought checkers that we felt had good attitude and personality, plus a high degree of manual dexterity, because we felt these characteristics were paramount to do a superior job with our new system.

Jensen said the result was a fast learning situation in a friendly, yet competitive environment. "Looking back, one essential ingredient which we feel was critical was having a vendor specialist on-hand during the entire learning process. The other was having one of our own people as part of the teaching team. Our people knew her and could relate to her direction."

The Accuscan system installed at the Minnehaha Mall store includes:

- Dual control centers with dual computers and dual disks (96 tracks, 491K bytes). This allows full "redundancy," that is, the ability for one system to take over should the other fail. These data retention features provide virtual fail-safe protection for all sales data.
- Nine front-end terminals with alphanumeric customer displays plus cash and utility drawers.
- One office terminal.

The system has the ability to provide total sales analysis for up to nine departments.

### Increased Productivity

"I know," Quisberg stated, "that our productivity has increased, but I haven't taken the time to conduct a formal study. More important to us is that we can get sales breakouts with a push of a button for up to nine departments, can determine, automatically, the number of people (and on a percentage basis) shopping by department, minute-by-minute and we know what's being bought and how much without taking a physical inventory. These capabilities were not possible with our previous system."

Quisberg has four stores in the Twin Cities with total gross receipts in excess of $25 million. His ambition is to have 10 to 12 stores within the next 10 years.

Electronic terminals are one way he hopes to cope with anticipated growth, through their ability to help control cash and maintain a more accurate and faster accounting system.

### Bad Checks Caught

"Our Accuscan system," he said, "will not cause any reduction in staff. What it will do is increase the capabilities of what our people can accomplish and add to the scope of their contribution. For example, in one day we saved over $250 by detecting bad checks. This was possible through the combination of electronics and a special verification program in Accuscan that scans for previous bad check experience. You have to ring up a lot of sales to recover $250."

Quisberg plans to utilize further applications capabilities inherent in the present hardware and Alpha 3 program package, but wants to move at a rate that can be readily assimilated within his stores's overall system and accounting procedures.

In addition to the existing Alpha 3 program package, Sperry Univac has indicated plans to make available, later this year, supplementary function capabilities in what it will call Accuscan Alpha 4.

Quisberg anticipates using full scanning sometime in the future, but doesn't see the necessity right now.

BEEHIVE'S B500

Intelligent Terminal
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Beehive International's B500, an 8080A microprocessor based video display terminal, offers excellent system flexibility and an unmatched cost/benefit ratio. Features include an expandable program memory, data transmission to 19,200 bps, and Full Duplex/Half Duplex on-line operation. Other features: edit functions, RS232C compatibility, format mode, two pages of 25 lines by 80 character display memory, block transmission, addressable cursor, upper and lower case characters, scrolling, and eight video levels. Beehive's B500 also utilizes a detachable typewriter style keyboard with an 11-key numeric pad.

Many options are available to meet exacting customer requirements. Keystroke programming and download capability from an external data source are available with the extra RAM memory option. Other options include 256 programmable characters, programmable keyboard, output printer port and an auxiliary I/O port with either serial or parallel interface option.

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B500
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*Second*, that installation now puts all of your 3277-type terminals in local mode, as if they were right at your host CPU site, attached to a byte MUX channel.

*Third*, now that your CRT stations are in local mode, polling is totally eliminated. Every 3277 is served on a demand basis, as if it were the only terminal on the network. Nor is there any need for polling software overhead. You don't need it.

*Fourth*, the result of this systems configuration is improved response time for every 3277, regardless of its location. On average, that improvement will be about four times better than what you now achieve: from an average of eight seconds, to just under two seconds. For *every* 3277, consistently.

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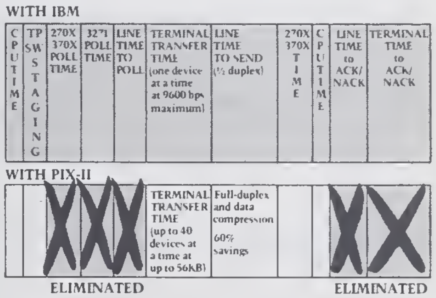
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270X 370X TIME
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### *With Help of Terminal System*

# Sporting Goods Wholesaler Scores Profit Records

COSTA MESA, Calif. — A Southern California sporting goods wholesaler is running up a scoring record for itself in the profits column as a result of upgrading its DP facilities.

Munson Sporting Goods, which operates in seven Western states, expects the move from a minicomputer to a larger capacity on-line terminal-based system will improve annual net profits by an amount approaching six figures. The secret is improved inventory control of the 13,000 items the company stocks.

"It's simply a matter of having sufficient computing power to determine what to stock and in what quantities," according to Ken Roberts, Munson's controller, DP manager and chief architect of the new system.

"A year ago, our sales were slightly above $16 million, but we experienced more than $1 million in 'zeros' (a trade expression for customer-ordered items that are out of stock). Since back orders are practically nonexistent in our industry, an out-of-stock item usually means a lost sale. Now our annual zeros are half that rate and falling," Roberts noted.

The new terminal-based system, a Hewlett-Packard 3000 small computer, has also helped Munson reduce by 20% its total investment in inventory despite an expected increase in sales volume during the year.

Moreover, the HP system is helping Munson meet its objective of shipping customer orders within 24 hours after the order is received. According to Roberts, this service to its 2,300 customers is extremely important to maintaining customer goodwill.

Two operators at Munson use HP 2640 display terminals to enter order data from either customer phone calls or courier-delivered orders for Munson's line of hunting, fishing, camping, athletic and marine products.

To produce immediate response to customer requirements, Munson's 30 field salesmen are being equipped with Azurdata portable terminals.

"A salesman can transmit a day's orders to our computer in about three minutes," Roberts said. Salesmen are also given weekly microfiche inventory levels to help them speed the order planning and transmittal process.

"Our salesmen appreciate being relieved of paper shuffling. And our fast response is proving a formidable sales tool for them," he added.

As orders are received, inventories are automatically adjusted. Thus Munson's four service people, who have access to terminals, can respond instantly to salesmen or customer requests with accurate inventory information.

Packing slips, with items listed in the most efficient order for warehouse picking, are automatic byproducts of order entry, Roberts said. Once stock is picked, a duplicate of the packing slip is routed back to the DP center. It then serves as a source document for data update via a terminal to signal the HP3000 that an order is being shipped and to prepare an invoice.

Further HP 3000 byproducts are sales analyses, commission reports, acounts receivable aging and general ledger accounting.

Munson's system provides extensive support for purchasing functions, Roberts indicated. Purchase requests are automatically generated for new stock at the most economical quantities. Reordering is timed by the computer to mesh with the seasonal nature of sporting goods. Using the HP 2640 terminals, purchasing personnel may retrieve instantly a 12-month forecast of sales by item either in tabular or graphic format, he said.

**Munson Sporting Goods Controller Ken Roberts uses the HP-2640 terminal to run budget and financial forecasts on the company's HP-3000 computer.**

Munson's six HP 2640 CRT terminals are located throughout the company's combined general offices and warehouses here. The terminal can present up to 1,920 characters on its screen in a 24-line by 80-column format and it allows users to edit or modify data off-line before transmission to the processor.

In addition, eight special function keys may be user-defined to initiate routines such as forms entry or on-line error detection.

One of the HP 2640s in Munson's accounting department serves as an on-line entry station for inventory receipts, cash or check application and accounts payable entries. Still another terminal is reserved exclusively for program development.

Most of Munson's programs are written in Basic, some in Cobol, Fortran and RPG. Image/Query, the HP 3000's data base management system, serves as Munson's data base manager and allows on-line inquiry and entry using simple and logical English statements, Roberts said.

As Munson's controller, Roberts is one of the firm's most ardent on-line users of its HP 3000. His personal terminal is used for financial analysis and budget forecasting. Budgets customarily are established a year in advance by month by department.

As the year evolves, an actual item may differ from its budgeted amount, e.g., sales in particular month substantially in excess of the amount predicted. The budgeting program will then dynamically factor this excess into other related accounts, e.g., purchases, commissions and profits, and the adjustments will be incorporated into budgets for the remainder of the year, he explained.

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# Users Seen Interested in Applications, Not Hardware

**By John A. Hill**
Special to Computerworld

There is a multitude of manufacturers of intelligent terminals. To succeed in today's marketplace, the manufacturer must have the ability to enhance a client's specific application to the point where the client no longer looks simply at the cost of the terminal but also considers the overall cost savings that can be achieved with a particular terminal.

In today's applications-oriented environment, customers are no longer just interested in hardware, instead, they want to know how a manufacturer can improve their overall operation from the standpoint of total cost savings, efficient utilization of personnel and prevention of premature hardware obsolescence.

In intelligent terminals there are basically two types of customers: DP managers and communications managers who have a good understanding of what they want to accomplish; and customers who have no knowledge of computers, DP or communictions but know their application in depth.

Those who have little or no technical knowledge look to the manufacturer for ideas and suggestions that will best meet their needs.

However, these customers usually have definite ideas about the type of display, clearness of character set, size of characters, keyboard layout, placement of special function keys, cursor movements, key colors, etc. These people are frequently more concerned with aesthetics than with actual operation, but the vendor still must be able to accommodate their wishes and desires.

For example, a terminal vendor must be ready to modify the keyboard to make it easy to operate. You may consider this an insignificant task, but to the customer it may be of paramount importance.

### More Sophistication

As a whole, however, the users of intelligent terminals are becoming more and more sophisticated.

When buying a terminal they no longer just look at purchase price; instead, they consider the overall cost savings that can be achieved with a particular terminal.

A company making a substantial investment in hardware wants to ensure that the equipment does not become obsolete tomorrow but that, by simply reprogramming the terminal, the same piece of equipment can be used for many new applications.

Thus, hardware cost is no longer the key to the intelligent terminal marketplace. The real thrust is being able to evaluate a prospective customer's requirements, not only to meet his immediate needs but also to anticipate future growth where savings could be realized over a longer period of time.

Before committing themselves, prospective terminal users now analyze such things as operator intervention, speed of response, error checking capabilities and communications costs. In other words, they need to know the cost of operators, throughput, communications and other items where costs have risen at a yearly rate of 10% to 20% over the last five years.

Many companies use several different computer systems and are thus faced with operating and maintaining a mix of vendor equipment. To simplify their operations, they are now looking for hardware that can be configured to operate with different types of major computers, can handle different protocols and can be reprogrammed to handle new applications.

Ideally, a user would like to concern himself with only one vendor, one type of terminal, one service organization, one set of spares and one set of operating instructions. To satisfy these requirements, a single terminal must now be able to satisfy several different protocols. The Megadata 700/UETS (Universal Emulating Terminal System) is an example of such a terminal.

Intelligent terminal manufacturers are finding it increasingly more difficult to sell a standard terminal configuration. Most customers want a keyboard, color scheme and other features that are tailored specifically to their operation.

They are looking for a supplier who can discuss applications and come up with ideas and suggestions for improving operations. The vendor must provide improvements for specific tasks and, most of all, must furnish a terminal that can relieve the mainframe computer of many mundane and routine tasks. A customer also wants to be sure that a terminal buy will not force him to change his overall method of operation and his present host computer configuration.

Recent advances in technology and especially integrated circuits will make it possible in the near future to build an intelligent terminal with as few as five to 10 integrated circuits.

This opens a whole host of new applications and markets for the terminal manufacturer.

Who is to say, for example, that every home owner could not be a prime candidate for the purchase of an intelligent terminal system to keep track of his monthly billing, checking account, energy consumption or meal planning, etc.?

*John A. Hill is vice-president of sales and director of marketing of Megadata Corp., Bohemia, N.Y.*

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### *For 63 Terminals in Eastern U.S.*

# CRT Terminals, Not CBs, Mark This Modern Trucker

CHERRYVILLE, N.C. — If you're a modern trucker, you've got more than CBs these days. You've got CRTs — at least if you're Carolina Freight Carriers Corp.

The $123 million trucking firm has 150 Honeywell VIP 7700 CRTs at its headquarters here and at 63 freight terminals in the Eastern U.S. More than 110 of them are configured with receive-only printers.

"When we began our first application in April 1974 — administrative message switching — we removed telephone equipment that was costing us $12,000 a month and stopped using a slow-speed teleprinter service that was costing another $12,000 a month," according to J.M. Froneberger Jr., the company's assistant secretary and assistant vice-president in charge of data services.

"That, of course, didn't cover the entire cost of leasing the CRTs and data circuits, but they did provide us with other longer term economies. We can keep better track of our equipment and shipments now and give better customer service," he said.

Initially the company installed 80 CRTs and 70 printers. The other terminals were added gradually as the firm added new applications and opened new offices.

**Communications Lines**

The VIP 7700s communicate over three 4,800 bit/sec circuits and seven 2,400 bit/sec circuits (with from four to 18 devices per circuit) to a Honeywell Model 6040 large-scale computer that was upgraded last March to a Series 60 dual-processor Model 66/20. The three 4,800 bit/sec circuits are economical enough for local use — they are all within a one-mile radius of each other and in clusters, according to Froneberger. The company has recently added another five 2,400 bit/sec circuits for a total of 12 that are used for long-distance communications.

Each of the 63 freight terminals uses a CRT configuration that can range from a single VIP 7700 with printer at the smaller terminals to as many as five VIPs with printers at the larger terminals. Buffer sizes for the VIP 7700 and printer are 1,920 characters or one screen format. Each is separately addressable so a freight dispatcher can compose a message on the screen at the same time the printer is receiving a message.

The printers operate at 30 char./sec at the low-volume locations and 120 char./sec at higher volume sites. Usually one or two copies of a document are produced, but on freight bills one original and three copies are printed.

The system handles about 30,000 administrative-type messages and more than 35,000 transaction processing executive messages that update files each day. It runs around the clock, 365 days a year.

The remaining VIP 7700s and printers are located in the rating department, central dispatch control and other offices throughout headquarters such as sales, claims, revenue accounting, traffic and maintenance.

Carolina Freight added the second major on-line application to the system in March 1975. That was equipment, or dispatch, control that enabled the company to track tractors and trailers from trip origin to destination and to know within seconds if a shipment was in transit or if a trailer might be loading or unloading at either a terminal or a customer site, according to Froneberger.

"It would also permit a dispatcher who needed special equipment, say a refrigerator trailer, to locate one immediately at the nearest terminal. Instant responses through the computer allow us to make firm commitments to customers on the first phone call and help us to be more competitive," he said.

On-line freight billing followed in September 1976. "That permitted us to get very close to our business," he said. "We can now account for our revenue the next day after a driver receives a shipment instead of waiting until truck mail brings the papers to headquarters."

When a truck is loaded the driver brings the bill of lading to the loading freight terminal office where the shipping information is entered and transmitted to the company's general offices immediately.

Delivery copies also are transmitted to the destination freight terminal so when the long-haul driver arrives, freight can be unloaded, checked and transferred immediately to the firm's local trucks, whose loads already are planned, for delivery to customer sites.

"Besides letting us begin final delivery and billing procedures earlier, this application has improved procedures for handling customer inquiries. We can identify any one of 100 or so shipments that might be on any particular trailer and provide immediate answers to questions," Froneberger said.

**Rating Consolidated**

Carolina Freight's next step was to consolidate the rating function at headquarters with the on-line system early this year. Prior to that the rate functions were performed at each freight terminal.

The 20 rating clerks at headquarters call freight bill forms to their CRT screens, so the correct charges from the tariff books can be applied. The computer extends the charges and the invoices are ready to be printed in the next morning's batch run.

"Centralized rating made the process more efficient so we didn't have to add more people as work increased,"

*(Continued on Page S/32)*

**Carolina Freight's Stoneham, Mass., operations manager John Willard uses a Honeywell VIP 7700 CRT to send information on trucks bound from the Boston area to the company's other freight terminals throughout the eastern U.S.**

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### *In Nationwide Network*

# Concentrators Let Credit Firm Expand with Same CPU

ATLANTA — A network of programmable terminal systems, each with the ability to concentrate Teletype traffic, has enabled one of the nation's largest credit reporting agencies to expand its business steadily without upgrading its mainframe hardware.

Continued growth for Credit Bureau, Inc. (CBI) depended upon the number of Teletype terminals able to access its data base here containing pay history information on more than 40 million consumers.

Three years ago, that growth path looked uncertain. Although employment of time-division multiplexers had trimmed line charges between Atlanta and the 24 cities in which CBI maintained offices or sold services, the firm's operating system software placed limits on the number of devices its IBM 370/168 could address directly.

"We were operating our Teletype network under IBM's CICS, within a partition of OS/MVT," Randy Wewers, assistant vice-president of data processing at CBI, said. "With our multiplexing scheme, we had been able to attach approximately 1,000 Teletype terminals to our mainframe, but we found ourselves very close to the limits of our operating system."

## Concentrators Chosen

One obvious if painful choice was able to attach additional Teletype terminals to a second mainframe. Instead, CBI chose to concentrate Teletype traffic through 24 PTS-100 programmable terminal systems from Raytheon Data Systems Co.

It was a logical decision to make for three reasons. The first was the cost of mainframe expansion. "We would have had to add at lease an IBM 370/168; more likely, another 168 — if we could have expanded our system at all, by going that route," Wewers explained.

Second, Raytheon provided a viable alternative for handling additional Teletype terminals because its PTS-100 systems were already in place, having been selected to replace IBM 3270 equipment at a cost saving of approximately 30%, he said.

"Third, Raytheon was the vendor that could do the job and we did look at others," Wewers added. "Teletype concentration was not a new concept. Raytheon had accomplished it earlier on its PTS-100 terminals emulating 2260 equipment. For us, they enhanced their 3270-compatible gear to do the same job, and, in the process, met some specific applications requirements we had relating to security procedures and the size of messages we had to handle."

The addition of a Teletype concentration capability to CBI's network not only allowed the credit reporting service to avoid adding additional mainframe processors, but also saved approximately 150K of core memory, freed roughly one-sixth of the capacity of its existing processor and eliminated several communications lines and a good deal of communications hardware, including nearly 150 communications adapters and numerous modems.

Since installation of the equipment began in mid-1974, CBI has more than doubled the number of slow-speed, low-cost Teletype terminals in place at retail stores, banks and other credit granting institutions in the markets CBI serves in the Eastern and Western U.S.

"The Raytheon systems have been a major factor in our ability to hold down the costs of the credit reporting services we provide," Wewers said, "and we expect that cost benefit will continue as our network continues to expand, almost daily."

## Faster Responses Demanded

He explained that the trend toward automation in the credit granting industry began in the late 60s, sparked by the demand for faster responses to consumers applying for credit.

"Prior to that time, the pay history portion of the credit granting process had been handled manually. The credit granter would place a phone call to his local credit reporting agency. A clerk there would search a manual file, pull the record on the particular consumer, if such a record existed, and read that file over the phone," he said.

Wewers said the first wave of automation involved the installation of hard-copy de-

*(Continued on Page S/33)*

# CRTs, Not Radios, Mark This Modern Trucking Company

*(Continued from Page S/30)*

Froneberger said. "It also increased accuracy in applying rates, since rate personnel specialize in handling tariffs between certain points.

A payroll reporting system for about 300 employees is already on-line. Hours worked are gathered from the terminals for the batch payroll system. Carolina plans to add the rest of the company's nearly 3,700 employees to the on-line portion of the system as well as other functions such as vacation or sick-leave accounting.

The terminals have improved the productivity of the company's DP department, according to Froneberger, since time-sharing provides a faster means of developing and modifying programs than the coding sheet, keypunch and run-when-you-can-get-the-time method.

The department consists of a director of DP, three systems/programming managers, six applications programmers, seven operators, one computer facilities manager and 28 others, including keypunch and document control clerks.

They currently are working on modifying other batch accounting and statistical programs for the on-line system. During the next two or three years they plan to modernize the accounts payable and accounts receivable programs; put the "over, short and damage" report on-line; and do further work in computerizing the tariff structure to allow the computer to do some automatic ratings.

Another on-line application Carolina hopes to add is a Zip Code delivery routing for local trucks. That would permit the freight terminal dispatchers to plan local deliveries even more precisely before the long-haul truck arrives.

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# Concentrators Let Credit Firm Expand While Using Same CPU

*(Continued from Page S/32)*

vices, often IBM 2740-type terminals, at credit reporting agencies. "A phone call still initiated the inquiry, but the response was improved because the clerk at the credit bureau could key the inquiry instead of searching a paper file."

Video terminals at credit bureaus came next, with IBM 2260-type devices most popular. The next evolutionary step in the automation of pay history inquiries was elimination of the human "interface" between the credit granter and the reporting agency's data files. Banks and larger retailers began to install Teletype terminals, which provided faster access at reasonable cost when inquiries were keyed directly to credit bureau computers.

Wewers noted that only about 2,000 of the 40,000 total credit granters CBI units and customers serve have installed terminals. The remainder phone inquiries direct to one of CBI's eight regional offices or to one of the 16 independent credit bureaus who purchase services from CBI. Those inquiries are transmitted to Atlanta via Raytheon display terminals communicating in a 3270 mode. Teletype-generated inquiries provide the lion's share of the volume coming into Atlanta, however — almost 70% of the total number of inquiries made.

### Expensive Overhead

That was the crux of CBI's problem: although Teletype inquiries were concentrated through strategically located, time-division multiplexers communicating with two Memorex 1270 front-end units, each port appeared, to the host, to have an individual Teletype terminal attached.

"Approximately 60% of the capacity of those two front ends was consumed by the 'handshaking' needed to support those Teletypes," Wewers recalled. "It was a tremendous hardware and software overhead burden, a very inefficient use of some very expensive resources. It made a great deal of sense to us to offload that traffic onto a less expensive device."

The network was upgraded by enhancing the PTS-100 with a function package consisting of a general-purpose communications adapter — a hardware interface between its system controller and a Teletype modem — and software to control the queuing in and out of Teletype message traffic. Five general-purpose communications adapters can be used with each PTS-100 controller, with each adapter able to handle four Teletype lines.

"All a credit granter has to do now is turn on a paper tape, key in identification and security codes, then key in the inquiries — as many inquiries as he wishes," Wewers explained. "He then dials the local credit bureau and places the phone in a telephone coupler or switches on the local low-speed data set. The PTS-100 answers automatically."

Messages travel from couplers over asynchronous lines at 110-, 300- or occasionally 1,200 bit/sec rates to low-speed modems at the PTS-100 locations, and those modems link directly to general-purpose communications adapters in the terminal system controller.

Sign-on information is transmitted directly to the host for authentication, after which inquiries, written into 256-byte buffers associated in PTS-100 memory with ports on the communications adapters, are transmitted to the 168 in Atlanta at rates of up to 9,600 bit/sec.

"We installed a Comten intelligent front end here to replace our 1270s," Wewers said, "with additional Comtens in Washington, D.C., and San Jose, Calif., to concentrate messages from Raytheon terminals emulating 3270 equipment. But all the host eventually 'sees' are what appear to be individual 3271 controllers, even though each controller may be handling as many as 20 Teletypes."

Credit granters see momentary pauses because inquiries are transmitted, processed and answered over the combination slow-speed, high-speed route in 256-byte blocks. Response times at Teletype terminals reportedly will improve when the network is upgraded to a double-buffering scheme. Double-buffering will enble each PTS-100 controller to receive a 128-byte response from the 168 while transmitting the previous 128-byte block to a remote Teletype terminal.

Automation in general has allowed CBI to consolidate into eight regional centers from more than 100 offices operating previously.

While some of those sites have only one PTS-100 system controller, others have as many as four, with terminal counts ranging from five to 43 and from one to seven 165 char./sec printers.

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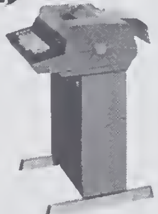

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### *To Move Motorcycles*

# Firm Builds SDLC Net Without Vtam/NCP Upgrade

BUENA PARK, Calif. — Yamaha Parts Distributors, Inc. has established a cross-country communications network employing Synchronous Data Link Control (SDLC) protocol without implementing IBM Vtam/NCP software.

Avoiding that software upgrade saved months of programming time and effort for the company, according to Wayne Mitzel, manager of data communications at Yamaha. Monthly operating costs for the network are approximately half the costs of similar land line links, he said.

The company established communications links via satellite between an IBM 370/145 at corporate headquarters and warehouses serving the Southern and Midwestern states. The satellite links support both remote batch communications from card readers and printers and inquiries from 3270-type interactive terminals. under full-duplex SDLC protocol.

Central to that network is PIX-II, a minicomputer-based "virtual data link" from Paradyne Corp. By supplying intelligence at all points within the network, PIX-II allows remote peripheral devices to operate as if they were locally connected to a mainframe, Mitzel said.

"We installed a PIX-II local control unit at headquarters and remote control units at both warehouses," Mitzel said. "Our programming effort at the central site was completed within half a day. We simply had to reassemble our DOS supervisor to give it some new addresses and to reassemble our terminal control program under CICS."

Mitzel said Yamaha could have implemented SDLC either over land lines or via satellite. Either route would have required implementation of Vtam/NCP.

"Both packages consume core and computer cycle time," he explained. "The programming effort would have required months worth of time and effort — compared with days to implement SDLC using Paradyne equipment."

Mitzel added that implementation of SDLC would also have required hardware upgrades at the central and remote sites. "We would have had to upgrade our front-end controller, which was sufficient for binary synchronous communication but not for SDLC. By using the Paradyne system we were able to eliminate our front-end controller altogether."

Implementation of SDLC would also have required that remote batch equipment be upgraded to the SDLC equivalent. "Instead, we saved some by replacing our equipment with card readers and printers," Mitzel said.

Each week, Yamaha headquarters transmits to each warehouse a master inventory list for that location. Reports transmitted each morning from headquarters allowed warehouse managers to update that master list. That updating was done manually prior to installation of on-line CRTs with the PIX-II system.

Mitzel said the SDLC satellite network made possible by the PIX-II system provides response within an average of three seconds to inquiries from any remote warehouse to master files.

"A warehouse manager can now tell a customer on the phone whether a part is in local stock or in stock at another location. Having that up-to-date information close at hand allows our regional warehouses to provide a better response to the customers they serve," he said.

Prior to installation of the PIX-II system, Yamaha warehouses transmitted remote batch data over Wats lines at speeds of 4,800 bit/sec. Mitzel said the company upgraded to 9,600 bit/sec to accommodate 3270-type interactive terminals.

"Communication over land lines at that speed might have given us better terminal response times," he suggested, "but an average three-second response is very acceptable when you consider the cost savings afforded by satellite over land line communications."

Satellite communications links cost Yamaha approximately $1,500/mo. Mitzel said the cost of additional land lines needed to support interactive termianls would have been approximately $3,000/mo.

## Original Goal

The ability to transmit inquiries from warehouses to the central data base had been Yamaha's original design goal, but that goal was rejected as too costly. Binary synchronous communication was too slow for the application, Mitzel noted, and SDLC appeared to require a major programming effort in addition to hardware upgrades.

Yamaha briefly considered the compromise of installing intelligent terminal systems at each warehouse, in order to maintain separate data bases for each location. Each data base would have contained up-to-date information on local inventory.

"That would have given us some improvement, but the inquiry capability would have been less than we really wanted and would still have required a significant programming effort. With PIX-II, all we have to do to add another warehouse to our network is install another remote control unit and plug in our peripherals," Mitzel stated.

Teleprocessing systems such as Btam, Tcam and Rtam are associated with specific devices, and each time a device in a network is changed, the software associated with that device must be changed. PIX-II eliminates the need for both front-end control units and teleprocessing software, he said. Host processors communicate through PIX-II local and remote control units to remote peripherals as if those devices were directly attached to the host.

In Yamaha's PIX-II system, data transmitted from the IBM 370/145 host is stored in buffer memory until an SDLC frame is assembled with each device buffer tagged with an address. Data is compressed and transmitted from the local to the remote control unit in seven 256-byte frames and passed from the remote control unit to peripheral devices attached to that unit at each warehouse.

"I found the PIX-II concept hard to believe, at first, but since installation last fall the system has run with very minimal downtime. It seems that for us, PIX-II represents the easiest, most effective method of establishing satellite networks," Mitzel said.

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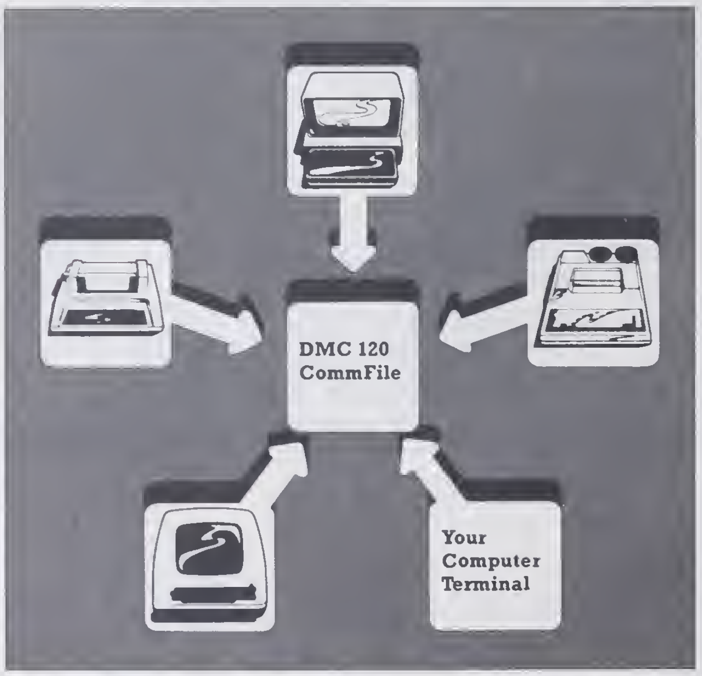

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# Remote Intelligent Terminals Seen Acting as Management Aid

**By Fonnie H. Reagan Jr.**
Special to Computerworld

Once, it was considered the height of system design sophistication to poll managers to determine their "information needs" and then to devise a set of reports that provided as many managers with as many of their requests as was practical. It was rather like giving a child his choice of as many candies as he could name — managers named all the pieces of information they could.

Cleverness in system design resulted in many combination reports that gave individual managers a different set of information pieces than they had requested. Data input followed the same pattern.

Managers had to provide some information that would be used to create information relationships, not for themselves, but for others. Computer usage thus developed under the control of a central facility with the sources and users (the managers) of the processed information frequently only peripherally involved in the system design.

The need to efficiently administer an expensive resource — the computer center — led to reduction in repetitious data storage and data manipulation through the development of data base management, which separates data processing activities from the data storage facility. A parallel hardware development has substantially reduced the cost of electronic circuits and small data storage devices.

### Pressure on Remote Locations

One effect of these two developments has been to create pressure for the remote locations to reenter the field of system design.

The most obvious example of this trend is the positioning of intelligent (or programmable) terminals in remote company locations to provide access to the corporate data bank. The combination permits local management much flexibility in acquiring, storing and processing information and therefore should allow better decisions to be made.

Central management is under dual pressures because of the development of distributed processing and data bases. One side is that described above, the provision of local management with better tools to keep track of day-to-day operations and to make better decisions.

The other side is the desire to use the corporate data bank and processing capabilities to provide information processing on a corporate basis. Allocation of corporate resources, measurement of company effectiveness and control of company cost parameters all require detailed knowledge of what the company has done, what it is doing and what is is committed to do. Resource allocation also demands knowledge of the effects of planned future activities.

In general, the sum of all the information available to individual managers is used for corporate information needs.

This sets up a dual set of needs for local management: use of the comptuer to further understanding of day-to-day activities and to report to the central site for corporate information needs. This leads to the logical conclusion that one terminal in the local office should serve several purposes.

It is conceivable that a single monolithic set of application routines could be written to completely model a company's business within the fremework of a single "program." It would provide a single interface for the terminal with all information requests, data input, report output and data base updates handled by a single application system. However, this is unlikely.

A company's business is understood too incompletely to make a precise model. In addition, the company environment is too dynamic to permit a single model to remain unchanged. A general-purpose model is too inefficient.

Rather, we are faced with something with which we have always been faced: the development of multiple application systems as they become needed, as the people resources become available to implement them and as our knowledge of business and computers grow to the point of understanding the application.

### Central System Architecture

Given the inevitability of multiple-application systems, each with the need for remote input and interaction, the question arises: What central application system architecture will best satisfy the needs?

Multiple terminals can be located at each remote site, each interfacing with a single application system, but the cost penalty of duplicated terminal equipment is obvious. Using a single terminal to interface multiple application systems introduces the additional host overhead to manage the interfaces, a cost that is not so obvious.

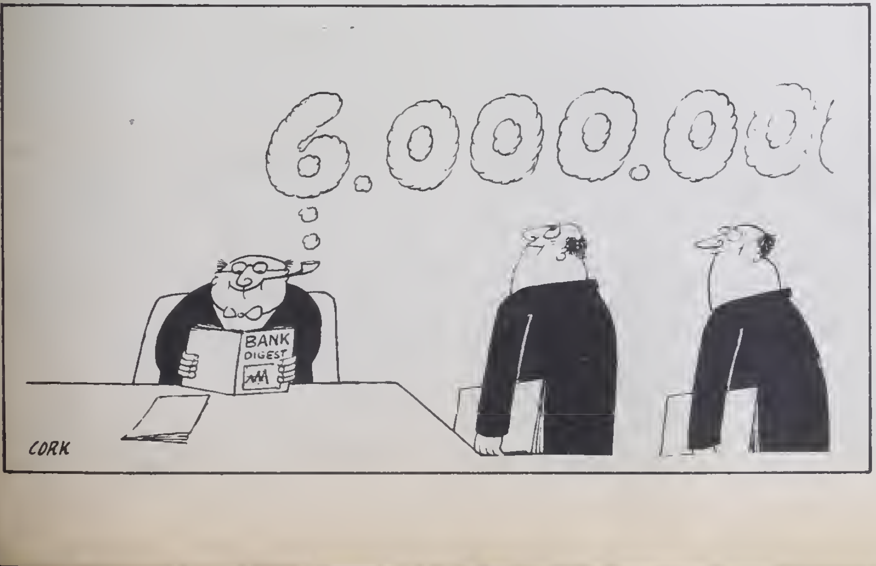
Additional decisions, such as determining application type, add to the system processing load, and a larger central computer is required just to maintain the same level of information processing. (The growth of main memory and CPU usage for the modern multitask operating system is ample testimony of the cost of implementing general-purpose capabilities.) That cost is justified on the basis of increased productivity and flexibility.

The availability of low-cost intelligent terminals makes multiapplication terminals practical. Tailoring functions of specific applications at the terminal site, rather than through host processing at the central site, almost eliminates the normally-expected increase in system overhead when converting to a "general-purpose" approach.

The extra cost of an intelligent terminal, compared to a nonprogrammable terminal, is easily offset by the reduction in the number of terminals required.

The net effect of multiapplication terminals implemented via programmable units is to improve information flow, data retention and data organization at the remote location while collecting the information the company needs for corporate analyses.

*Fonnie Reagan is managing editor at Datapro Research Corp., Delran, N.J.*



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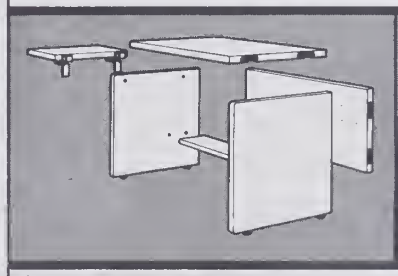

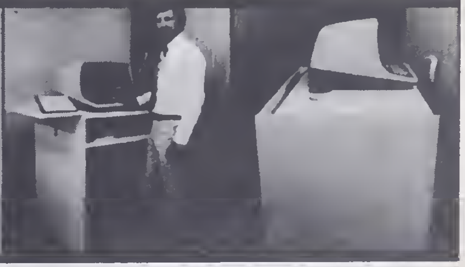

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# Slate Terminal System Handles S&L Transactions

DAYTON, Ohio — A service owned by nine savings and loan associations in the Dayton area is making it possible for customers to withdraw or deposit funds to their accounts at their supermarkets.

Named Slate (an acronym for Savings and Loan Automated Teller Exchange, Inc.), the service includes remote service units (RSUs) at the courtesy counters of local food stores which are on-line to a central DP center. Customer transactions are immediately debited or credited to appropriate accounts.

While they are associated for purposes of Slate, the member institutions are independent in all other aspects, including maintaining their own DP systems, according to Douglas R. Gannon, president.

One association uses the services of American Financial, in Cincinnati, as its computer center. Four others use the Savings and Loan Data Center in Cincinnati, which is a part of Automatic Data Processing. The remaining four associations use the NCR data center in Dayton.

"The associations were content with their DP services," Gannon recalled. "It would have been foolish to disrupt their systems to consolidate them all in one system just to handle the debit cards. Instead, we decided to interface with their systems."

To do this, Slate had to communicate with a conglomeration of equipment. American Financial uses an IBM 370/145 computer mainframe with a Periphonics Corp. front end. The FDS/I terminals are programmed to look like IBM 2980 terminals going into the front-end system.

Savings and Loan Data Center has a Burroughs B500 mainframe with a Varian Data Systems V72 front end. It uses a mixture of terminals — NCR 270 and Burroughs TC700 — so several protocols are used. The NCR Data Center uses an NCR Century 300 mainframe and NCR 270 and 279 financial terminals.

"We had a choice of establishing our own data center or buying shared service," Gannon noted. "We did not feel we wanted to go to the expense of equipment, people and software to build our own center. Instead, we surveyed a number of services and settled on the NCR data center here in Dayton."

In addition to being local to Gannon's operations, he said, NCR offered to underwrite the cost of developing the software to make the system operate. The software remains proprietary to NCR; however, Gannon feels it was a profitable trade-off for both Slate and NCR.

### Software Objectives

One of the primary software objectives was the development of an electronic switch which makes it possible for any customers of any of the associations to use any of the in-store terminals. The switch software includes a file of tables which relate each card number to the issuing association.

Upon confirmation from the association's computer, the switch transmits confirmation back to the terminal, then debits the customer accounts and credits the store's reconciliation account.

The switching function is complicated by protocols. In one case, the NCR computer has to look like an IBM 2980 when it completes a transaction. In another, it has to look like a modification of an NCR 270 financial terminal, and in the third, like a "pure" NCR 270.

"The software is flexible enough to add a module into the switching system to look like whatever terminal an association utilizes," Gannon said. "When the data centers get our message, they treat us as if we were just another branch and some more tellers that have been added to their system. The switch then reformats the message for our terminals and sends it back out in the response."

Slate is one of only two such systems in the U.S. that utilizes an electronic switch, Gannon noted. The function can be performed by inserting hardware between the Slate CPU and the associations' data centers. Memory was available on the NCR data center's computer, though, so it was decided to use a partition of the NCR 300 computer as the switch.

**Supermarket customer transacts business with savings and loan association through use of "Cash Plus/Prestige" card which gains access to system. Salesperson then enters transaction into NCR 279 financial terminal.**

### Furnishes Terminal Equipment

Slate furnishes all terminal equipment for use in the stores. Card verification is done through identikey units. These units use the card number and any combination of letters or numbers as the customer's personal identification number (PIN). The card number and PIN are fed into an algorithm which results in a third number. This number becomes the customer identification to the computer.

To make customer operation of the PIN entry pads simpler for the customer, Gannon changed the key caps from an adding-machine-style keypad to Touch-Tone telephone style because he felt it was better for the general public and would result in fewer keying errors.

Transactions are completed on NCR 279 financial terminals which Slate installs at the stores' courtesy counters. "These were one of many units we could have used," Gannon recalled. "A number of sites we visited were using them, so we knew they worked. But also important to us was the fact that very fast maintenance service was available."

Interassociation transfers were also a consideration in the design of the software system. Each of the associations and merchants has its own banking affiliations, Gannon said, and the intent was not to disturb these relationships just for the Slate service. Instead, the settlement transfers are handled in the Slate system using the commercial bank clearing system.

The Slate data processing system operates an hour longer than the stores are open each day to allow completion of cash

*(Continued on Page S/37)*

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### Using National Statistics

# Terminals Help Patients Determine Life Expectancy

**By Ann Dooley**
Of the CW Staff

MADISON, Wis. — Patients at the Adult Medicine Clinic here can determine on a computer how long they have left to live and what they can do to prolong their lives.

The program shows people who are basically healthy how their living habits and medical history will affect their life expectancy, according to Dr. Larry Van Cura, a university professor.

The health hazard program consists of national statistics compiled at Methodist Hospital in Indianapolis on the most common causes of death, according to age, sex and race.

There are 15 major causes of death, some of which are auto accidents, suicide, homocide, accidents, pneumonia, stroke, leukemia and coronary artery disease.

These causes are correlated with risk factors such as use of alcohol or tobacco, miles driven, whether seat belts are worn, amount of exercise, blood pressure, serum-cholesterol, height and weight and medical background, Van Cura said.

The health hazard appraisal is an attempt to convey information to people about what the state of their health actually means in the long-range view, according to Van Cura. "We are trying to help well people stay well," he said.

Once people know the risks, hopefully they will change their behavior, he added.

### Youth-Oriented Society

"We live in a youth-oriented society and when you tell someone they have the same risk of dying as someone older than they are, it makes them think," he said. "Probably more people are going to raise their level of health by decreasing risks than by any other method so far," Van Cura said.

Other medical centers use the same risk factor analysis, according to Van Cura, but Wisconsin is the only place where the patient directly accesses the computer.

The clinic has used patient/computer interaction for more than 10 years and patients often prefer the anonymity of the machine, Van Cura pointed out.

The patient types the answers to questions appearing on the screen of a Hazeltine 2000 CRT. It amounts to a 20- to 25-minute interview, he said.

The information includes questions on health patterns, medical backgorund and cholesterol level and blood pressure, if it is known. If it is not, it is added later after an examination, he explained.

The data is transmitted to a time-sharing computer at the University of Wisconsin Computer Center where the patient's results and risk of dying in the next 10 years are compared with the national average.

The computer is programmed to indicate the patient's physical health age. It also indicates which factors are most critical to that individual's health and what would most likely cause his death.

Both good and bad habits are taken into consideration before a prediction is made, Van Cura said.

The program has only been in operation since the first of this year but several hundred people have already used the computerized health hazard appraisal, he said. Eventually, he believes, such clinics will be available in the home by using a television screen to communicate with a main computer.

It is still too early to determine if the health hazard appraisal has changed people's actions and bad habits, according to Van Sura, but a follow-up study is being planned to find out if any beneficial changes have occurred.

# Slate Data Terminals Track S&L Records

*(Continued from Page S/36)*

drawer balancing. At the end of the day, reports are printed for all associations and files are updated.

By the time the associations open the next morning, they have completely updated files and a complete audit trail of the previous day's transactions, according to Gannon.

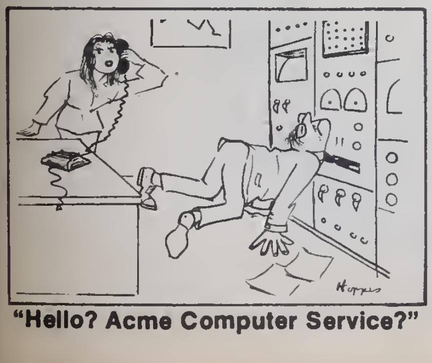
### Daily Reports

The stores also receive daily reports on their terminals' activity, though neither the customer names nor association identifications are given. The reports, however, mirror the journal tapes in the NCR 279 terminals, so the stores can check the reports by sequence number.

"There was also a decision about what kind of cards we would use," Gannon reports. "Eight of the associations were Transmatic licensees for Prestige cards, and one was not. Geoffrey E. Hill and Associates, Inc., a consultant in Columbus, Ohio, designed new cards with the Prestige design and the words "Cash Plus" on the face. The back of the card has the Cash Plus Money Center design we chose for Slate.

Slate provides a complete service to associations using it. In addition to the data processing and card design services, Gannon's organization also trains both association and in-store employees and promotes new store placements and card use. It also secures licensing from the Federal Home Loan Bank Board for both new store placements and associations joining the network.

Now that the system is operating, Gannon expects to expand it to other thrift institutions in the area. "We've designed a very flexible system that gives the thrift institutions a lot of advantages without disrupting either banking affiliations or data processing operation," he concluded. "And we look for more to join Slate as our card base and supermarket locations grow."



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# Arco Alaskan Terminal Network Keeps North Slope Oil Flowing

At Prudhoe Bay on Alaska's North Slope, drilling operations, production facility testing and other procedures are now producing oil for the Trans Alaska Pipeline.

One of the major owner companies involved is Atlantic Richfield Co., which operates the east side of the oil field. To effectively operate in this hostile environment, Atlantic Richfield performs around-the-clock preventive and remedial maintenance, material management and administrative programs. These systems use two Data 100 Keybatch remote terminal systems located in Alaska and connected by satellite telecommunication to an IBM 370/168 computer in Dallas.

The system enables Arco's Prudhoe Bay operations personnel to plan maintenance activities (workload leveling, reserving spare parts) and to follow correct job procedures (required tasks, skills and tools), while ensuring that maintenance is scheduled at predetermined intervals on equipment representing a large investment.

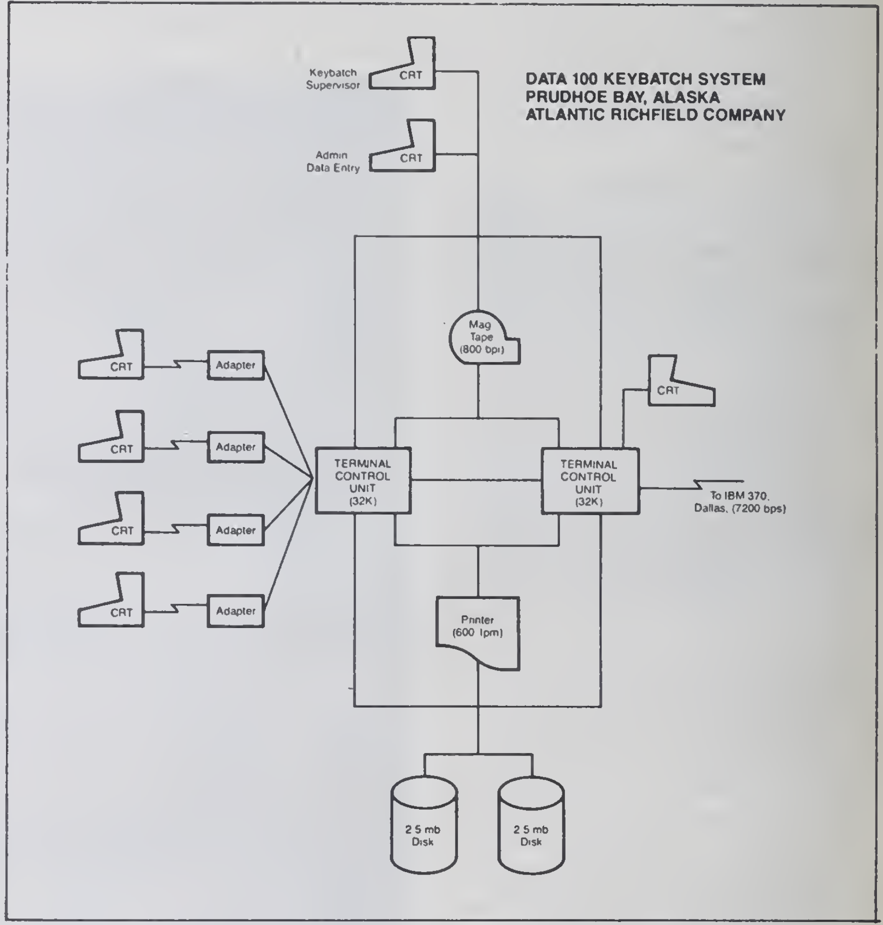
The system is also used to capture data concerning remedial maintenance performed. Management reports are produced which reflect the degree of adherence to schedules and to track equipment performance.

One Data 100 Keybatch system was installed in October 1976 in Anchorage. It is used mainly for processing administrative data. The second Keybatch system was installed in December 1976 at Prudhoe Bay. Each system has its own dedicated 7,200 bit/sec satellite channel which interfaces with Arconet, the company's private communications network.

According to H.M. Haseltine Jr., manager of systems and programming in the administrative department of Arco, the economics of operating on the North Slope dictate that required equipment maintenance be performed with as few people and as little paperwork as possible.

"This means developing a multifunction data entry/remote job entry system that minimizes DP throughput time in what amounts to almost a real-time environment," he said.

Arco initially looked for a single terminal which would provide the capability for both on-line interactive processing and remote data/job entry to support the batch environment. However, this was not possible with the hardware available then.



The compromise solution was two sets of hardware, Keybatch terminals supporting the remote entry and IBM 3275s supporting on-line functions.

The system at Prudhoe Bay consists of a central unit at the operations center and remote keystations at the activity locations. These remote stations are located in warehouse areas, maintenance shops and potentially at other major production installations.

These operational areas are linked to the central terminal controller/processor through the local microwave communication system. Communications capability, therefore, was an important factor in equipment selection.

The central terminal system in the opera-

(Continued on Page S/39)

'There Is Quite a Conflict Between Our Systems and Operations People.'

# With Remote Batch Equipment Doing Preventive Maintenance

*(Continued from Page S/38)*

tions center consists of dual Keybatch terminal controllers with data channel, a 600 line/min printer, two 2.5M-byte disks, 800 bit/in. magnetic tape, various communications controllers and adapters and administrative and supervisory keystations.

All master files for Alaskan preventive maintenance are kept in the IBM 370 in Dallas. These define Prudhoe Bay equipment with regard to place, maintenance requirements and job history. The 370 automatically schedules jobs and sends job summaries to the remote site so that maintenance personnel can plan their activities.

The user at Prudhoe Bay has the option to decide what jobs he wishes to work on in a daily or weekly period. He may cancel, reschedule, initiate or substitute jobs as he sees fit. He enters transactions to the system through input of a job number followed by a key word and description. From this data, master files in Dallas are updated and job support documents are generated, where required, and transmitted back to the Keybatch printer at Prudhoe. An activity report regularly shows current status of each job.

The remote site operator may do both online inquiry and batch data entry. For online inquiry, the operator uses an IBM 3275 under CICS software. For batch data, such as transactions to update the master file, the operator keys in the transaction to the central Keybatch system where it is accumulated on the disk.

At some point during the day, whenever volume dictates, the central Keybatch terminal operator transmits the batched data to Dallas with the appropriate job control language to execute the catalog procedure for initial job processing.

When the master file updates are complete, the remote stations can do inquiries against the new data base through the 3275s.

The Anchorage installation has a dual-processor terminal system with a 450 card/-min card reader, a 9-track 800 bit/in. magnetic tape, two 600 line/min printers, a 10M-byte disk and four local Keybatch keystations. A peripheral switch between the two processors allows them to share common peripherals. Transactions from Anchorage involve administrative, production and payroll data, in addition to scientific applications such as reservoir engineering and geophysical modeling.

In addition to commnnicating via the 7,200 bit/sec dedicated satellite to Dallas, the Anchorage system has a dual-modem switch that enables switching over to a 4,800 bit/sec voice-grade dial-up line on the dial-up phone network. Thus, the system can interface with any data communications network having a comparable communications arrangement.

Hazeltine said that one of the main reasons why Arco chose the Keybatch system was operating system version 3.1, which contains a "communications save" and a "communications restore" software feature. It allows data to be transferred disk-to-disk on any Data 100 multifunction product in the Arco network.

An operator can do a communications save for any particular data set. This transmits the data set to an output queue on the 370 and then on to whatever terminal site needs the information, thus eliminating transferring hard copy, he said.

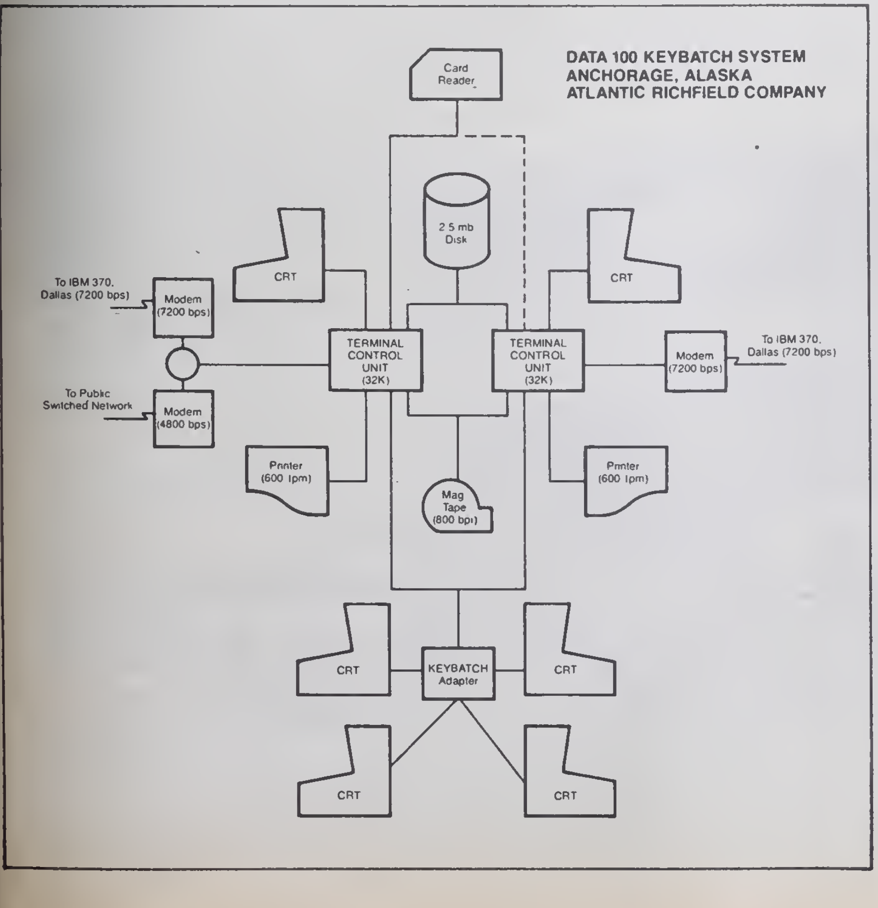
Arco has developed application software interfacing the material management system for automatically expediting the issue of parts needed in maintenance. When the preventive maintenance section has decided what job has to be done, the 370 automatically generates a parts picking ticket which is transmitted to the designated storeroom, giving location of job, identification of parts and quantity.

Storeroom attendants pick the parts and deliver them to a staging area so they are ready when maintenance personnel arrive to begin the job. When the job is complete, data is entered into the system indicating parts used and manhours expended, from which a history file is created in the mainframe.

Hazeltine said they use practically all the software functions available on the Keybatch operating system. The number of batches submitted from Prudhoe will average 20 per week, depending on master file maintenance volumes and on-request needs.

The multi-function Data 100 systems in Alaska, combining data entry and communications functions, serve as part of a system which provides high-speed filing systems and "alarm clocks" to facilitate the efficient performance of maintenance work.

Thus, the systems contribute to more efficient operation and reduction of operating costs in the harsh environment of Alaska's North Slope, Hazeltine said.



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# COMPUTER INDUSTRY

### CCIA and Others Testify

## S.285 Would Put More Monies in Small Businesses

**By Edith Holmes**
Of the CW Staff

WASHINGTON, D.C. — Too many private pension assets are tied up in large, secure corporations, leaving little of this money to be invested in small and medium-sized businesses, several proponents of a bill that would alter that situation told the Senate Finance Committee and the Select Committee on Small Business here recently.

The current distribution of these funds is both "inequitable and imprudent," according to A.G.W. (Jack) Biddle, president of the Computer & Communications Industry Association (CCIA).

The CCIA, MRI Systems Corp. chairman Alfred A. King and Cummins-Allison Corp. president John E. Jones testified in support of S.285 known as the "Tax-Exempt Private Pension Investment Act of 1977. "S.285 would put investment limitations on large pension managers so private pension plan participants would not find their money tied up in a few corporate stocks.

Small and medium-sized businesses would benefit from the passage of the bill, sponsored by Sen. Lloyd M. Bentsen (D-Texas), because more pension monies would be freed for investment on their ventures, Biddle suggested. The availability of pension funds would help these businesses solve part of the overall problem of capital formation which threatens their existence, he added.

The present situation is one in which "small and medium-sized businesses have been stalled and shut off from funds badly needed for productive growth [and] are not able to contribute their full share of vigor to the american economy," King told the senators.

The MRI chairman stated it is the small growth company, and not the mature dominant one, which brings innovation and new technology to the marketplace.

"I am sure that fund managers have a myriad of defenses for the close relationship that exists between them and large corporations. None of them, however, can be persuasive against the very real threat to the economic viability of the U.S. and to our free enterprise economic system," King said.

"Fortunately, America has not lost its entrepreneurs," he maintained. But as reasonable after-tax guards continue to be taken away from the entrepreneur, "There is no more incentive for the individual who sticks his neck out."

From King's viewpoint, S.285 "confronts head-on the issues of reducing the interrelationship between the [Private Pension] institutions and large corporations and returning the flow of equity capital to smaller businesses."

Favoring the "carrot" to the "stick" approach, however, King added the sale of securities of large corporations might be taxed at a low rate for the capital gains they produce or might be permitted on a tax-free basis if the funds are reinvested within a defined period of time in small or medium-sized businesses.

Also testifying in support of S.285, Cummins-Allison's Jones told the commit-

(Continued on Page 38)

### What's at Stake

S.285 would put an excise tax on pension managers, effective Dec. 31 of this year.

If the bill is passed, a 5% tax will apply on investment if the pension assets are greater than $1 billion, if investment is in a corporation with a capital account greater than $150 million and if, as a result of the investment, the manager has greater than 5% of any class of the corporate security.

If this "violation" is not corrected within 180 days, S.285 calls for the levy of a tax of 100% on the investment.

## Lower Prices, More Capability Highlight Dumb Terminal Moves

**By Molly Upton**
Of the CW Staff

While denials of a price war abound among terminal makers, there is no dearth of action in the low end of the product lines.

The evolving trend is twofold: lower prices for bottom-of-the-line products, as from Lear Siegler, Inc., and more capability for the same price or less, as from Infoton, Inc. and Beehive International, Inc.

Lear Siegler, which recently dropped the price of its bottom-of-the-line ADM-3 terminal to $895, contends the unit isn't the cheapest and the firm doesn't intend to have the lowest prices, according to Lee Falco, vice-president and general manager of the Data Products Group. "We're shipping all we can right now," he said.

However, other vendors expressed surprise at Lear Siegler's ability to cite such a low price because it uses distributors rather than direct sales.

Falco said he doesn't know of any price war — "no more than usual" — and added he doesn't encourage bottom-line pricing.

Factors contributing to the price cut were advances in technology and competition. "Let's face it, if it weren't for competition our price would be $1,295," Falco said.

Prices on dumb terminals will probably stabilize for the next 12 to 18 months, Falco said, and then technology will bring more price reductions.

Dave Zeiter, product manager for terminals at Beehive International, agreed prices on low-end terminals have stabilized for a while, adding there will likely be a price break on other terminals next spring.

Thanks to increasing use of semiconductor components there will be increased capabilities on terminals at a lower price than presently, he said.

The number of features offered within the past year on Beehive's low-end terminal have grown by 20%, but the price hasn't changed, he noted. These features include blinking, cursor control and format control whose capabilities are provided by the semiconductor components.

Most of the firm's sales of dumb terminals are in the $800 to $1,000 range, he said.

Infoton's approach is exemplified by its

(Continued on Page 38)

## HIS vs. Arizona Continues

PHOENIX — Attorneys for plaintiff Honeywell Information Systems, Inc., defendant State of Arizona and intervenor Sperry Univac recently met in a crowd-packed court here to present verbal arguments in HIS' suit against a state computer procurement.

Following the oral arguments, the judge took the matter under advisement and issued a preliminary injunction barring the State of Arizona from awarding the contract until he makes a ruling.

HIS had previously obtained a preliminary restraining order after learning it had lost a state contract to Univac, despite the fact its bid was lowest.

The request for proposal (RFP) was for a replacement for an IBM 370/145 used by Arizona to participate in a nationwide job-matching network. Participation in the Economic Security Automation Plan (Esap) is funded by the Department of Labor but administered by the individual states [CW, June 20].

RFPs issued last January resulted in bids from HIS, for a 66/10 at $661,171; from IBM, for a 370/148 or alternatively for a 370/158 at $2.1 million; from Univac, for a 1100/80 at $1.4 million; and from Comdisco for a 370/158.

HIS was advised it had the lowest submitted price for that particular element of the procurement — the mainframe and memory components, according to an HIS spokesman.

Following the submission and opening of the bids, however, IBM announced its nationwide price decrease for the 158s.

HIS and the other vendors were subsequently informed by letter that all bids were rejected by the Arizona Department of Administration based on a determination that it was in the public interest to have a rebidding, presumably because of the reduction in 158 prices.

A second round of bids was submitted April 25. HIS changed its proposal to a 66/40, which it felt was comparable to a 158 in performance, priced at $1.01 million. Univac rebid the 1100/80, but lowered the price to $1.3 million; Comdisco bid its 158 at $1.3 million; and IBM rebid a 158 but dropped its price to $1.5 million, he said.

HIS was then informed by the purchasing section of the State of Arizona that the 66/40 bid was "nonresponsive" and therefore would not be considered for contract award.

HIS protested the refusal, resulting in the restraining order.

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# 'Crazy Quilt' of Laws Hit for Frustrating U.S. Trade

WASHINGTON, D.C. — Special-interest laws and shortsighted governmental policies are dulling the American competitive edge in world markets, especially in advanced technologies where the U.S. excels, according to Charles Wohlstetter, chairman and chief executive officer of Continental Telephone Companies.

Wohlstetter singled out communications and data handling, which are not labor-intensive but draw on high technology, as foreign trade areas that offer particularly good opportunities for American participation. A "crazy quilt" of conflicting laws and policies, however, is frustrating the best intentioned efforts of industry to exploit these opportunities, he said at a recent seminar here.

Citing the German, French, and Japanese governments in particular, Wohlstetter said they enthusiastically support their own industries in recognizing that many foreign sales depend on financing and extended terms as surely as favorable interest rates and payment schedules affect the saleability of a house or car.

"In the years from 1970 to 1976, the volume of Japanese exports has increased at twice the rate of our own. In four of the last 10 years, the value of U.S. imports has been greater than our exports. This year's deficit could easily be larger than any in the past," he said.

Perhaps the most crippling blow ever struck against U.S. export trade came with the passage of the Tax Reform Act of 1976, Wohlstetter said. Three of its most damaging features were the recapturing of the previously deductible corporate tax credit on foreign losses, the elimination of the special tax benefits awarded to U.S. companies in developing nations and — worst of all in his opinion — the lowering of the earned income exclusion for U.S. citizens working abroad.

The last provision, Wohlstetter said, has resulted in an outflow of American engineers and administrators during the last year from the Middle East, the fastest growing world market. Since extra compensation to redress the high expense of foreign living is now taxable, an American firm can hire approximately two and a half British engineers for the price of one from the U.S.

This deprives American telecommunications companies of a prime competitive advantage, the ability to export qualified people to manage, operate and maintain the systems they sell overseas, he stated.

# Low-End Terminal Mart Active

*(Continued from Page 37)*

1200, a terminal with an end-user price of $1,195, which is less expensive than its predecessor GTX model although the unit offers more features, according to Ed McCormack, director of marketing.

Other firms such as Hazeltine and Applied Digital Data Systems have done the same thing, he observed.

Although Infoton's price on the 1200 drops to $850 in quantities of 100, McCormack said, the firm has no plans to announce a "rock-bottom low-end terminal." It's much tougher to make a profit in the barebones area since profit depends heavily on volume, he said.

The majority of Lear Siegler's terminal business is in the dumb terminal area, although the firm has announced its entry into the intelligent field with its Video Display Processor 400.

In the year just completed, the firm sold about $30 million in CRTs and is now shipping over 2,000 unit/mo. This figure will probably approach 3,000/mo by the end of the year, Falco said.

Beehive's Zeiter said his firm decided not to go after ADM-3-type business because it wants to keep a decent margin for its distributors.

Although Beehive's B100 is selling well, Zeiter said he does not consider it a direct competitor with the ADM-3 because it is field-upgradable.

People like the idea of the cheapest price, but they also want 30% more features at a least-cost price. Many of these select the B100, he said.

Out of its entire terminal line, about half the shipments are in the low-end teletypewriter arena, he said, whereas this probably contributes only 35% to revenues.

Beehive plans to definitely ship more than twice as many dumb terminals as last year, when the B100 was not in full production, Zeiter said.

# S.285 Puts Capital In Small Businesses

*(Continued from Page 37)*

tees his company "has been limited to debt financing to sustain its steady growth of between 10% and 15% per year.

"With a more favorable investment climate, with the availability of external equity capital to Cummins, I feel its growth rate could increase to 25% to 35% over the next three to five years," he said.

The Cummins-Allision president identified other needed steps in pension and capital formation reform. These included a reduction in the cost and amount of federally required paperwork and a return to lowered taxation of capital gains.

Jones also cautioned the committee members that while "elimination of the double taxation of dividends may also provide some relief, such tax reform would tend to benefit only the larger companies who are able to pay dividends.

"Growth companies cannot afford to pay out substantial dividends, if indeed they can pay them out at all, since the earnings before any declaration of dividends must be used to finance growth," he added.

"We cannot trade capital gains reform for the elimination of double taxation of dividends. [This] would furthcr isolate the small and medium-sized companies from the capital markets. And the capital drawing power of the large corporations over the financial markets would be assured," Jones maintained.

Returning to S.285 and emphasizing the duty of the pension manager toward the people participating in the private pension plan, said, "We may realize that the present conduct of the portfolio manager is defensive in nature, but it is certainly not defensible conduct in view of the pensioner's entitlement to the best yields he or she can get."

S.285 is a "much needed first step toward a reform of the too conservative standards of the pension funds," Biddle stated for the CCIA.

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- The evaluation and selection process — a case study.
- Minicomputer maintenance — analysis of possible methods (vendor maintenance, independent service organizations, and end user self-support) with an eye to cost savings.
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# F&S Sees Militarized DP Mart Growing at Annual 12%

**By Toni Wiseman**
Of the CW Staff

NEW YORK — Militarized computers represent a substantial and growing market — one that will grow from slightly over $400 million in 1977 to more than $650 million by 1981, according to Frost & Sullivan, Inc. (F&S), a market research firm here.

The growth, which averages approximately 12% per year, is attributed to the increasing complexity of military systems, increasing costs resulting from inflation and the increased utilization of computers as components of subsystems that previously used special-purpose computational and control elements, an F&S report noted.

F&S defined a militarized computer as one "designed to meet military performance specifications in terms of ruggedness, [mean time between failures, mean time to recovery] and environment; general-purpose in nature, i.e. programmable; primarily digital; and identifiable as a separate and distinct element of any system or subsystem in which it is used."

The Air Force's B-1 bomber, a major program for that segment of the armed forces, will demand 5,000 computers of varying sophistication, the report said.

Total Air Force computer funding was projected to rise 68% in the 1977-81 period for a cumulative budget of $1.0 billion, with aircraft and avionics systems accounting for 50% of the total.

Avionics R&D budgeting during the five-year period will account for $68 million, the study noted.

The Navy and Marine Corps will spend approximately $915 million during the five-year period, with combined aircraft/-avionics programs emerging as the primary Navy submarket. This submarket will grow at a rate of 56% during the period to $420 million, F&S predicted.

Army computer expenditures are expected to grow 57%, reaching a total of $705 million for the period. Here again the aircraft/avionics submarket will lead, with weapon control/command control and missile systems computer needs following.

"There is a strong and increasing trend toward standardization throughout the Department of Defense. At the same time, there is an increasing trend toward proliferation of computer types by industry as microprocessors are used in a wider range of systems," F&S noted.

"As recently as a decade ago, the military computer market was dominated by a relatively small number of firms that had the resources to design and support state-of-the-art computer systems.

"Today, low-cost reliable integrated circuits, microprocessors, memories and related devices open up the market to a much broader range of companies," F&S stated. In recent years, it added, the challenge of militarized computer design has shifted to the mechanical packaging with the electrical design playing a much smaller part.

# DataComm 78 Set for February

WASHINGTON, D.C. — Some 75 companies, 250 speakers and 4,000 data communications professionals and managers are expected to be on hand for DataComm 78 when it is held at the Sheraton Park Hotel here Feb. 21-23.

Several members of the DataComm 78 advisory group have been named, including Thomas Pyke of the National Bureau of Standards, George Berstein of the Naval Supply Systems Command, Elizabeth Severino of EFS Associates and Fred O'Keefe of the Association of Data Communications User.

This year's program will be broken into three segments. A "basics" program has been designed for users who are not yet using data communications. Sessions will deal with planning, selecting and implementing data communications systems.

A series of in-depth workshops will provide information on narrowly defined fields such as network analysis; data communications software; and terminal, modem and multiplexer capabilities.

Finally, the conference will feature product "rap sessions" during which a panel of vendors and users will discuss trends in 18 product areas.

The fee for the conference and exhibit is $45 for one day, $115 for all three days. Further information is available from Ed Halsted at The Conference Co., 60 Austin St., Newton, Mass. 02160.

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### OEM Sales Flourishing

# Paradyne Seeks Unique Solutions in Communications

**By Toni Wiseman**
Of the CW Staff

LARGO, Fla. — Paradyne Corp. views its role in the industry as a provider and developer of products that offer unique solutions to many of the most common and complex tasks in computer-based data communications systems — for both end users and OEMs.

Robert S. Wiggins, president, said the company's strategy has been to provide product innovation in three ways:

- First, by identifying and committing early to technologies that appear to have broad future potential.
- Second, by incorporating features in its products that substantially reduce the complexity a user would otherwise encounter in performing data communications tasks.
- Third, by enhancing the functional range of its products well beyond the performance specifications of products offered by other suppliers.

A privately owned firm, Paradyne had revenues of $10.7 million last year and expects to grow between 30% and 35% annually, according to Jay Hill, vice-president of marketing.

Paradyne's revenues are derived from two product lines — high-speed modems and PIX II, Hill noted.

PIX II is a virtual data link system which allows IBM 360/370 users to perform remote processing over a variety of communications media, such as dial networks, private land lines, digital networks and satellite facilities.

Paradyne concentrates on high-speed modems, mainly 9,600 bit/-sec and some 4,800 bit/sec units, an area it plans to expand in with microprocessor technology, Hill said.

Modems account for a third of the firm's U.S. revenues and half of its international revenues. A large portion of its sales are OEM, he said, noting three OEM contracts alone — with Burroughs Corp., Nippon Electric Co. and L.M. Erricson — will amount to $5 million over the next few years.

Aside from AT&T, Paradyne's main competition is Codex and Milgo in the 9,600 bit/sec market and Milgo in the 4,800 bit/sec arena, he said.

"We're much more aggressive than anyone else on purchase prices," Hill stated. "All our competitors put out high-quality products, so we have to use all the marketing strategies we can, and one is to stimulate sales through prices."

Paradyne's lease pricing is also very close to most others in almost every situation, he noted.

"Our modems are known to have one functional advantage over others — they work on unconditioned lines better than anyone else's," Hill claimed.

## OEM Business

OEM sales account for about 25% of Paradyne's business, according to Robert Budenstein, director of OEM international sales.

On the OEM side, modems comprise the majority of sales as both users and manufacturers become aware of technology advances and what these advances can mean in operation.

"Users, for instance, are becoming more sophisticated and understand their own needs better. They don't just buy the newest product in a manufacturer's line anymore," Budenstein stated.

Paradyne, he indicated, is now providing terminal manufacturers with the ability to integrate high-speed communications capability into their terminals, tailored to their needs and in such a way as to provide the end user with a total single-vendor capability.

Integrated modems are becoming more and more viable for terminal manufacturers, he asserted.

"With the introduction of LSI there were less things to go wrong. And with the introduction of minis combined with LSI technology, we have a situation which says there are a limited number of printed circuit cards to do the job, so servicing becomes easy — in many cases simply a case of finding the bad card and replacing it on the spot," Budenstein said.

Maintenance no longer requires a highly skilled technology-oriented engineer, he added.

Taken as a whole; this means the user can demand a protective umbrella — one phone call to one vendor when something goes wrong, be it in the terminal or the modem.

"Paradyne has the expertise in-house to provide, modify and manufacture communications equipment tailored to the needs of the terminal maker. This means the manufacturer doesn't have to refit the terminal to the modem, which is a lot different than buying an 8080 chip off the self," Budenstein said.

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*(Published quote of an independent computer expert. Name on request.)

# Mainframers' Ink Runs Black in First Half

## •IBM Net Grows 11%

ARMONK, N.Y. — IBM Corp.'s six-month results for worldwide operations benefited from a 10.8% increase in gross income from rentals and services.

Earnings for the quarter ended June 30 rose 11% to $658-million or $4.44 a share compared with $592.8 million or $3.95 a share during the same period last year. Earnings in the first quarter of the year rose only 5.3%.

Revenues grew to $4.419 billion, up from $4.014 billion in the year-ago quarter.

For the six months, earnings climbed to $1.23 billion or $8.26 a share based on an average of 149.2 million outstanding shares. For the same period in 1976, earnings totaled $1.14 billion or $7.57 a share on 150.2 million shares.

Revenues for the six months were $8.509 billion compared with $7.828 billion in the year-ago period.

Gross income from rentals and service rose 7.5% for the six-month period to $5.467 billion, up from $5.083 billion. Income from sales totaled $3.042 billion compared with $2.744 billion in the 1976 half-year.

For the quarter, sales income rose 14.4% while rental and service income grew 7.6%.

"Outright purchases of data processing equipment for the second quarter increased substantially over the levels of both the first quarter of 1977 and the second quarter of 1976," according to Frank T. Cary, chairman of the board.

"Incoming orders and shipments continue to show good increases over the comparable 1976 periods," he added.

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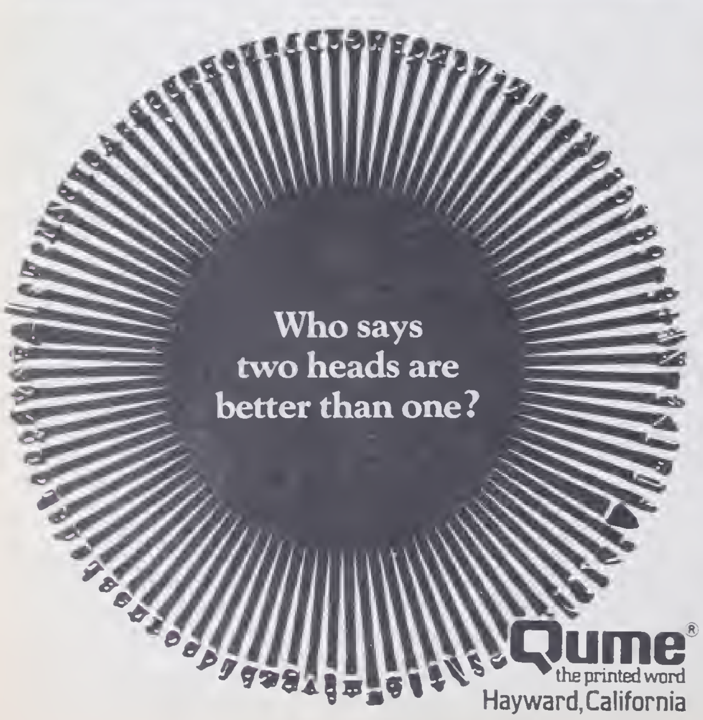

## •NCR Sees 86% Increase

DAYTON, Ohio — A surge in earnings from overseas operations contributed to an 86% increase in earnings for NCR Corp. during the second quarter.

Earnings soared to $34.4 million or $1.23 a share compared with $18.5 million or 72 cents a share in the year-ago period.

Revenues also rose — 13% — to $627.8 million, up from $556.3 million a year ago.

Second-quarter results brought six-month earnings to $51 million or $1.84 a share, a 61% increase over the 1976 half's $31.7 million or $1.26 a share.

Revenues for the period climbed to $1.14 billion, an 11% increase over the 1976 half's $31.7 million or $1.26 a share.

William S. Anderson, NCR chairman, said that although the company's U.S. operations were the largest contributor to second-quarter earnings increases, net income outside the U.S. was also well ahead of last year. This contrasted with this year's first quarter, in which earnings outside the U.S. were relatively flat.

"Better business conditions were reflected in a high level of shipments of computers and terminal products during the second quarter," Anderson said. "A second favorable factor was improvement in margins resulting from manufacturing cost-reduction programs."

He also cited improved profit contributions from the field engineering and Appleton Papers divisions and from Data Pathing, Inc.

"We anticipate continued good earnings growth in the third and fourth quarters. However, the percentage gains are not expected to match those of the first six months, since earnings in the last half of 1976 were considerably stronger than those of the first half," Anderson said.

Incoming business in both the second quarter and six months was ahead of last year's bookings, he added. "With a generally favorable economic outlook and a record number of new product introductions, we expect 1977 bookings to exceed those of any previous year," he said.

NCR's expenditures for research and development for the first six months were $55.8 million, an increase of 31% over the $42.4 million spent in the first half of last year. For all of 1977, R&D expenditures are expected to reach $120 million.

## •CDC Earnings Rise 26%

MINNEAPOLIS — Control Data Corp. reported consolidated earnings of $14.6 million or 85 cents a share for the second quarter of 1977, a 26% gain over the $11.6 million or 67 cents a share in the year-ago quarter.

This figure included earnings of $9.8 million from CDC's Commercial Credit subsidiary.

Computer business revenues for the second quarter were $369.8 million, up 10% from $335.1 million for the same period in 1976.

For the six months, CDC's earnings rose 21% to $26.3 million or $1.52 a share compared with $21.7 million or $1.25 a share in the year-ago period.

Half-year revenues reached $708.0 million compared with $641.7 million in the first six months of 1976.

William C. Norris, chairman, noted that CDC continues to experience improved business across a broad range of computer-related products and services. As a result, second-quarter computer business earnings totaled $4.8 million vs. $2.8 million for the second quarter of 1976.

Computer services were a particularly strong contributor to the improved second-quarter results, Norris added. In particular, data services revenues, aided by a number of new products, grew 22% compared with the same quarter a year ago.

Earnings in the third quarter may not show an increase over last year's 87 cents a share, he noted, because of the particularly strong results in the computer business in last year's comparable quarter.

## Nickels & Dimes

**Centronics'** board of directors approved a 5-for-4 stock split in the form of a 25% stock dividend payable Oct. 4 to holders of record Aug. 29. A cash dividend of 25 cents a share payable on all shares outstanding after the split, including the new shares, was also voted.

$$$

**Wyly** again extended the expiration date of the exchange offer for its 7-1/4% convertible subordinated debentures due 1995 and its 4% convertible subordinated sinking fund capital notes due 1983. The new expiration date is Sept. 30.

$$$

**Raytheon** declared a quarterly dividend of 25 cents a share payable July 27 to holders of record July 8.

$$$

**AVX** has declared a quarterly dividend of 8 cents a share payable July 28 to holders of record July 8.

## Acquisitions

**Itel Corp.** has acquired **Facts Nationwide Teletype, Inc.**, a privately held DP company that provides industry information to coin dealers throughout the U.S. Itel has also purchased the **Margin Monitor System** and operations from Bank Computer Network Corp.

**Alanthus Corp.** has agreed to acquire all of the outstanding stock of **MI2 Corp.**, a manufacturer of data communications equipment, from Motorists Development Co., a subsidiary of Motorists Mutual Insurance Co.

**EG&G, Inc.** has agreed in principle to acquire **Quality Measurement Systems, Inc.** The transaction will involve an exchange of EG&G common stock for all the outstanding shares of Quality stock.

**Automatic Data Processing, Inc.** (ADP) has completed the previously announced acquisition of **First Data Corp.** for 302,345 shares of ADP common stock.

**NLT Computer Services Corp.** has signed an agreement to purchase the Washington, D.C., Memphis, Tenn., and Beloit, Wis., offices of Analysis and Programming Corp. of Greenwich, Conn.

**U.S. Datacorp** has acquired certain assets as well as the commercial computer output microfilm business of **Trusco Datacorp**, a division of the Trust Co. of Georgia.

**Datatrol, Inc.**, a subsidiary of Applied Devices Corp., has purchased inventory, tooling, capital equipment, patents and rights to the **Amcat** product line of terminals and systems from Addressograph Multigraph.

**Pertec Computer Corp.** has acquired **Mits, Inc.** The agreement calls for the exchange of 746,154 shares of Pertec common stock for the approximately 966,900 shares of Mits currently outstanding.

**System Development Corp.** has acquired the **Stockmaster Division** of Space Application Corp.

**W. Ardis Lowrey**, chairman and president of Digital Development Corp., has acquired the stock holdings of two minority shareholders and thus has become the sole owner of **Digital Development**, a San Diego-based disk memory manufacturer.

**Horiba Instruments, Inc.** has acquired the **Vehicle Emission Computer Systems** business of Interautomation.

**Informatics, Inc.** has acquired **Management Horizons Data Systems, Inc.** from FNCB Capital Corp., a subsidiary of Citicorp.

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## Survey of Industrial Firms

# Micro Use Seen Growing, Diversifying

FRAMINGHAM, Mass. — Microcomputers have proven their worth to industry and in the future will become much more prevalent — and not necessarily only as dedicated control devices, according to market research involving industrial manufacturing firms.

The survey, conducted by the Nigberg Corp. here, sought to measure attitudes toward micros in a broad range of industrial markets, ascertain how micros are typically evaluated and highlight attitudes towards specific micro features.

On a base of 494 respondents, 60% indicated they were currently using micros and 17% said they were planning to use them.

Of these respondents, 30% indicated they were proficient in microcomputer design from the ground up and 22% indicated they were proficient in system design. Only 5.3% expressed no familiarity with micros at all, according to Nigberg.

The most popular reasons for using micros in a product were to reduce cost and increase product capability, the survey found.

Eight-five percent of the micro users develop software for their systems in-house, primarily because they feel they do a better job, Nigberg said. Assembly language was far and away the most popular programming language used (57.1%).

## Microcosm

When evaluating new microcomputer equipment, 73.1% of the respondents indicated that two to four people were involved. A large task force of five or more people evaluates microcomputer equipment in only 14.4% of the responding companies, while close to 12% of the respondents indicated that a single individual conducts the evaluation, the survey showed.

Given the criteria of price, the specific applieation, equipment brand name, reliability and performance, the most likely eriteria for recommending purchase were specific application and performance, rating 47.8% and 22.5% respectively, Nigberg found.

Other research findings were: price is not the most important factor in micro evaluation; micros are not necessarily best used with a larger host computer; low-cost memory is an important factor in the growth of the microcomputer; modular expansion is important; and micros should have their own high-level langauge developed for use in applications.

# NEC Has Thimble Printers

LEXINGTON, Mass. — NEC Information Systems, Inc. has introduced a line of character printers, utilizing a "thimble" printing element, that print a 128-char. set at up to 55 char./sec.

The thimble elements last about 50% longer than many wheel-type printers, according to the firm.

The Spinwriter series includes five models, all of which are microprocessor-controlled.

Features include a choice of five standard interfaces, 10- or 12-pitch characters, Ascii compatibility and numerous typefaces, the firm indicated. Custom interfaces are also available.

Model 5510 is a receive-only printer; 5520 a KSR unit; 5530 a word processing unit; 5540 has a split platen; and 5500 is a basic OEM unit.

The Spinwriter features a rotating thimble, electronically driven print hammer and servo motor-controlled positioning system.

The units require no lubrication, NEC said.

In lots of 100, prices for the 5500 through 5540 range from $1,140 to $2,600. Deliveries are expected to begin in October from NEC Information Systems at Five Militia Drive, Lexington, Mass. 02173.

# Intel Unveils Software

SANTA CLARA, Calif. — Intel Corp. unveiled two software related systems: a real-time control package for SBC 80 and system 80 packaged systems; and a faster mathematics unit.

The RMX/80 real-time multitasking executive is modular and users can link on task modules. The nucleus modules require 2K bytes and contain task-to-task and I/O communication, real-time clock control, interrupt and priority resolution, Intel said.

Bootstrap devices are not required, since all or part of the total program can be stored in erasable programmable read-only memory (Eproms) or read-only memory (ROMs), according to the firm.

Optional modules include a diskette subsystem, a free space manager and a software debug program.

Intel's Intellect Microcomputer Development System supports generation of RMX/80 systems and development and use of a library of task modules, the firm said.

Initially, RMX/80 runs on 8080A-based computers. It costs $1,950 including all modules and a year's free update service, Intel said.

The SBC 310 High-Speed Mathematics unit from Intel's OEM Computer Systems Group enables SBC 80 computers to perform mathematical operations an order of magnitude faster than with microprocessor software, the firm said.

Multiple processors can share the unit via Intel's Multibus.

The SBC operates concurrently to the SBC 80 computers. It costs $595 in single quantity and is a 6.75-in. by 12-in. board assembly, Intel said from 3065 Bowers Ave., Santa Clara, Calif.

### Zilog Offers Z80-MCS

CUPERTINO, Calif. — Zilog, Inc.'s Z80-MCS microcomputer system includes the Z80 CPU, a disk controller, 16K bytes of dynamic random-access memory (RAM) and 3K bytes of programmable read-only memory (Prom), which contains basic routines such as system debugger, floppy disk driver, console driver and bootstrap routines.

The unit is in a 19-in. chassis with 600,000 bytes of dual floppy disk storage. It can address 64K bytes of main storage and has an RS-232 or current-loop serial interface, the firm said.

The system cost of $6,000 in single quantity includes documentation covering both hardware and software. Optional software includes Basic and MCS-Rio. MCS-Cobol is scheduled to be introduced in the fourth quarter, the firm said.

Zilog is at 10460 Bubb Road, Cupertino, Calif. 95014.

### 8X300 Prices Cut

SUNNYVALE, Calif. — Prices have been reduced 40% on the 8X300 microprocessor from Signetics Corp. to $48.75 in quantities of 100 to 999.

The bipolar unit has a fixed instruction set and is optimized for control applications, the firm said.

Typical applications include peripheral controllers, data communications, CRT terminals, power control systems and entertainment devices, the firm said.

Signetics is at 811 E. Arques, Sunnyvale, Calif. 94086.

### 6800 Gets Floppy

SAN DIEGO — A single or dual floppy disk system for the Motorola 6800 microprocessor is available from Electronie Product Associates, Inc.

The unit is equipped with drive electronics, power supply, controller and exorcisor-compatible interface for the 6800 along with floppy disk operating system, assembler and editor.

The price is $2,595 for the single drive and $3,295 for the dual-drive system from Electronic Product Associates at 1157 Vega St., San Diego, Calif. 92110.

## Portable Console Supports OEM Tests

SANTA CLARA, Calif. — Intel Corp.'s uScope 820 microprocessor system console is a portable system developed to support OEM test and maintenance.

The unit contains an 8085 and initially handles systems based on the 8080A.

Diagnostic routines can be executed while the system under test is running in real-time under control of its own microprocessor, Intel said.

The uScope Probe 8080A is supplied with a keyboard-display overlay and personality read-only memory (ROM).

Intel plans a package of diagnostic routines for the SBC 80/1 and a probe, overlay and ROM set for the 8085 micro and 8085-based single-board computers.

The 820 can be used to monitor, display and alter register memory and I/O values and to control operations including halt, single-step, run with display and run in real-time, Intel said.

The 820 console panel includes hexadecimal as well as binary displays. The entire unit costs $1,520, while the uScope Probe 8080A set costs $480 from the firm at 3065 Bowers Ave., Santa Clara, Calif. 95051.

# Intel Adds 8085-Based Units

SANTA CLARA, Calif. — Intel Corp. has brought out lower cost versions of its single-board computers utilizing the 8085 processor as well as other products based on the 8085.

The SBC 80/04 costs $99 in OEM quantities or $195 for one unit and operates on a single +5V power supply.

The SBC 80/05 is priced under $200 in OEM quantities.

The units contain the 8085 processor, whose typical instruetion execution time is 2 microsec and can operate as self-contained computers, the firm said.

### 80P05 Package

Intel's 80P05 prototyping package contains the 80/05 and hardware and software necessary to construct and evaluate OEM processing and control systems with either SBC, the firm added.

In addition, Intel introduced the SDK-85 system design kit, a design and evaluation system for microcomputers based on the 8085.

The kit contains all components necessary to construct an MCS-85 system, including CPU, memory and I/O, the firm said.

### Monitor Software

It also includes system monitor software in read-only memory (ROM), an interactive keyboard display and a design library, the firm said.

The kit costs $250 in single-unit quantities and is available through Intel's distributors, the firm said.

In the 80/20-4, Intel has doubled the resident memory on an SBC 80/20, which is based on the 8080A.

### 4K-bit RAMs

The unit uses 4K-bit static random-access memories (RAMs) and can store up to 4K bytes of data on the RAMs and 8K bytes of program in optional erasable programmable read-only memories (Eproms) or masked ROMs, which are now 16K-bit devices.

The SBC 80/20-4 costs $995 and the standard SBC 80/20 costs $895 in single-unit quantities from the firm at 3065 Bowers Ave., Santa Clara, Calif. 95051.

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You will be responsible for the design, development, implementation and user training for manufacturing and marketing management information systems. The hardware/software is a large 11/70 using BASIC PLUS under RSTS/E. Ability to closely relate with non-EDP personnel to accurately define their needs and recommend solutions is a necessity. Will have responsibility for all phases of projects, maintenance of existing systems, setting of programming standards and documentation. This position offers high visibility to management and users. BS or equivalent is required with experience using BASIC and data base techniques.

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You will be responsible for the research, design, documentation, and implementation of an automated information system. This system will support the manufacturing process and related interfaces, i.e., A.P.T. You must have a manufacturing background and three to five years systems and programming experience, preferably using BASIC PLUS. A knowledge of PDP-11 hardware and software is an asset. We also require the ability to communicate clearly with the user community. BS in Computer Science or equivalent helpful.

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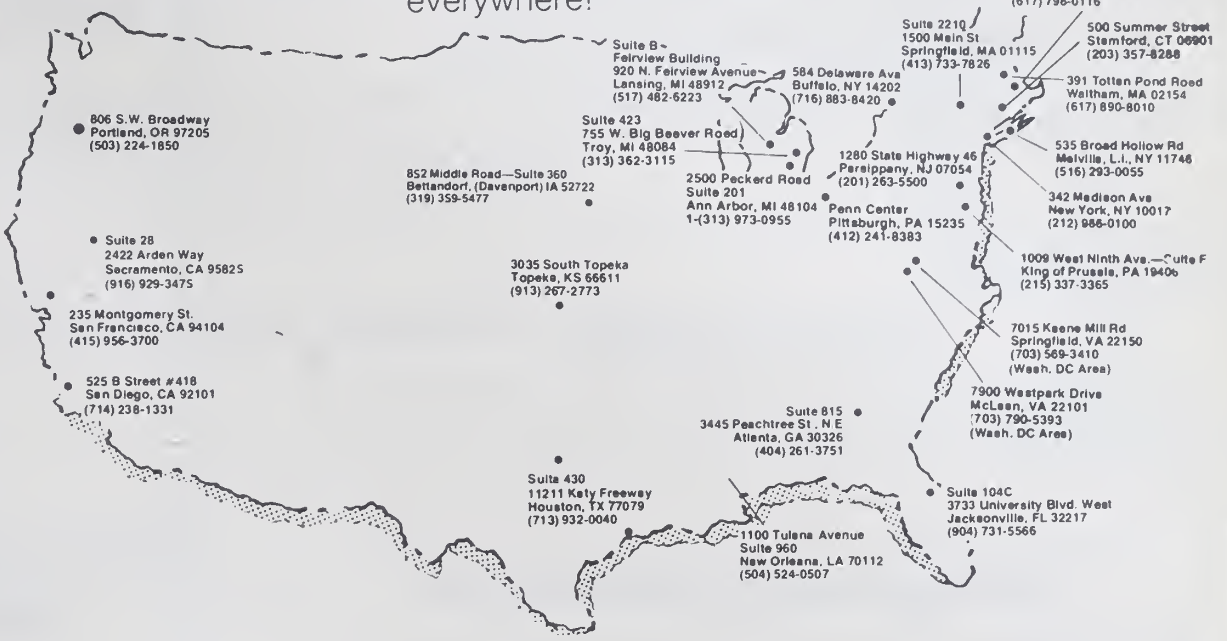

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Candidates with at least 2 years experience in assembly and higher level languages for real time, on-line systems are required. Ability to program, debug, install and troubleshoot software on PDP-11, Nova, Varian or similar minicomputer is important.

## SYSTEMS SUPPORT

Openings exist in Maryland, Chicago, Detroit and New York for systems personnel to support customers in the field. Responsibilities include defining retail systems specifications, bringing software expertise to the marketing/sales cycle and providing liaison with customers in problem solving and training.

## ADVANCED DEVELOPMENT

Individuals with background and potential to develop minicomputer operating systems, real time on and off-line applications, distributed processing techniques, higher level languages, telecommunications and data base management systems are requested to apply.

For the above openings, appropriate degrees are preferred, but significant technical accomplishment is a more important consideration.

Qualified candidates in the listed skills are requested to call Don Parsons, Employment Manager, on our toll free number 800-638-6395 or forward resume and salary requirement in confidence to:

**GENERAL INSTRUMENT CORPORATION**
DATA SYSTEMS AND SERVICES GROUP
11126 McCORMICK ROAD HUNT VALLEY MARYLAND 21031
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## APPLICATIONS PROGRAMMER

Our Academic Computer Center is looking for a person to provide programming support to users of our PDP-10. Must be able to interface with faculty, students and staff. Knowledge of assembly language and Fortran or COBOL required. Knowledge of statistics desirable.

Please send resume and salary requirements to Personnel Office, #102.

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## PROGRAMMERS ANALYSTS

We are currently searching for Programmers/Analysts for client companies in the following metropolitan areaa: ATLANTA, NASHVILLE, COLUMBUS, ST. LOUIS, CHICAGO, DETROIT, ROCHESTER, BOSTON, NEW YORK, PHILADELPHIA, or WASHINGTON, D.C. Positions require a minimum of two years of applications and/or systems software programming experience using COBOL, FORTRAN, PL/1 or Assembly Language with IBM 360/370, Univac 1108, Honeywell 6000, DEC PDP-10/20, DEC PDP-11, HP 3000 or similar systems. Knowledge of IMS, TOTAL, System 2000 or similar DBMS desirable. Degree in Computer Science, Math, Engineering or equivalent desirable. Salaries to $30,000. All positions 100% employer fee paid. Call (301) 474-6266 or submit resume to:

**Tech-Ed Services**
**10011 Rhode Island Ave.**
**College Park, Md. 20740**
**(Agency)**

## PROGRAMMER

Career opportunity for experienced Programmer, Min. 3 yrs. experience on IBM equipment required. Required language-COBOL under DOS/VS. Additional desirable exp. includes RPG, CICS, DL/1 and SPMOL TP exp. plus. Salary commensurate with experience & qualifications. Superior benefits package. Send full resume including salary, history & requirements to Personnel Manager, P.O. Box 2406; Savannah, Ga. 31402.

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When one of the world's largest computer companies promises total commitment to one of its professional groups, you know that group can offer extraordinary professional opportunities to its members.

Digital's Distributed Systems Development Group in Marlboro, Massachusetts is just such a group. Here, you'll be working at the leading edge of technology in a fast-paced, highly visible environment. And the projects will give you complete systems exposure plus the automony to pursue individual initiatives – all with the full support of Digital.

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If you have a high level of creativity and inventiveness in utilizing extremely advanced computer system methodology, we have an excellent opportunity for you. We're seeking professionals to design and develop programming systems for a major network program: integrating the DECsystem-20 into a large sophisticated network using PDP-11 front ends. Program assignments include software systems, real time systems, and communications programs.

Responsibilities include interacting with other senior level engineers in the areas of programming research and design problems, plus acting as a consultant on advanced computer system technology.

You should have a BS in Mathematics, Computer Science, or other technical discipline, or equivalent, plus 3-7 years programming experience, including a background with large-scale operating systems. TENEX experience is a plus.

*To apply for an exciting and challenging position with a world leader in this field, please send your resume to Carol Reed, Digital Equipment Corporation, 200 Forest Stree, Marlboro, Mass. 01752.*

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## Manager Data Processing

Expanding San Francisco East Bay manufacturer of clinical diagnostics and specialty chemicals is seeking a hands-on professional with experience in systems design, coding and implementation. Interactive, on-line minicomputer based business systems experience is required. Candidates should have strong communication skills and ability to work effectively with all levels of management. Familiarity with manufacturing applications as well as general business systems is also required. This new position offers the opportunity for career growth, competitive salary and benefits. Send resume in confidence, including salary history, to Personnel Director, Bio-Rad Laboratories, 2200 Wright Avenue, Richmond, CA 94804. An equal opportunity employer, m/f.

**Bio-Rad Laboratories**

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## DATA PROCESSING PERSONNEL

EG&G Idaho, Inc. the prime operating contractor to the Energy Research and Development Administration at the Idaho National Engineering Laboratory has immediate openings for:

### SYSTEM ANALYSTS
### SENIOR PROGRAMMERS
### PROJECT LEADERS

Candidates should have a college degree, or equivalent, and a minimum of 4 years experience in the development and implementation of business and management information systems along with proven capability in ANS COBOL. Experience with MARK IV and/or DBMS and a knowledge of JCL for OS/MVT is desirable.

Idaho Falls, Idaho, is a medium sized community located close to top-flight winter sports areas (Sun Valley, Jackson Hole, Grand Targhee) and unexcelled summer recreational areas (Yellowstone, the Salmon and Snake Rivers, and the Grand Tetons).

If interested and qualified, please submit resume, including salary history and requirements, in confidence to:

Technical Employment

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**PATTERN ANALYSIS AND RECOGNITION CORP.**
of Rome, NY, has opportunities for programmers and systems analysts. Attractive openings exist for experienced programmers to contribute to the design and development of sophisticated software systems for real time and interactive applications. Systems analysts are needed to lead the development of an interactive experimental facility for real time processing of airborne sensor data. Advanced graphics techniques will highlight this display-oriented system. Candidates must have at least one year PDP 11 assembler experience or equivalent. We are a very successful, highly professional corporation and offer unparalleled personal career growth. Please send detailed resume including salary history to:

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PAR Corporation
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Large Cooperative Food Distributor, located in Central Flordia, is seeking (2) two senior systems analyst to develop financial and distribution applications. Positions require 3-5 years experience in the design of teleprocessing oriented systems. Knowledge of DOS/VS, CICS, Cobol is highly desirable.

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**of Florida, Inc.**
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**Ocala, Fla. 32670**

# Field Engineering Specialists

Amdahl Corporation has earned an international reputation as builder of the most advanced large computer systems. Since our first shipment two years ago, we have delivered a quarter of a billion dollars worth of computers to the world's major companies and institutions. The company is exciting, the environment stimulating, and our compensation and benefits are excellent.

We seek Field Engineering Specialists who have a minimum of 5 years' experience in maintaining large-scale systems with in-depth training on compatible CPUs. You will have company support in assisting the Amdahl customer in his mixed-vendor environment to maintain full operations in his center. You will have the opportunity to work with multiple customers, to guide and support field engineers, and to use your technical expertise for your own personal development and the growth of the Amdahl Corporation. Openings exist in several major cities and at Amdahl headquarters in California. Please indicate 580-E on your response and direct it to Employment Manager, Amdahl Corporation, 1250 East Arques Avenue, Sunnyvale, CA 94086. We are, of course, an equal opportunity employer.

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# Career Opportunities in EDP

## SENIOR PROGRAMMER

Computer Services - Bachelors Degree in Computer Science or Math with concentration in CS plus two to three years applicable experience in COBOL or ALC using IBM 360 or 370. Non-degreed applicants with heavy applicable experience will be considered.

## SENIOR ANALYST

Computer Services - Bachelors Degree in Computer Science or Math with concentration in CS plus three years Programming and one to two years in Analysis. Non-degreed applicants with heavy applicable experience will be considered.

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# Systems Software

## UNIX* Installation

### *San Francisco Peninsula*

Exceptional opportunities exist in BNR's growing PDP 11/70 group, which supports an R&D laboratory for the telecommunications industry. Major computing activities include real-time software development and word processing. Maintenance of the UNIX system and development of translators, documentation and testing aids are required to support the software engineering lab. Remote access of a 370/168 complements our in-house facility.

## Computing Support Manager

Position requires an experienced manager to direct our computing facility. Responsibilities include systems programming, facilities management, and long-range planning for computing needs.

## Systems Software Engineer

Systems programmer with UNIX experience is required to develop support tools, such as document formatters, simulators, and compilers. UNIX system enhancements will also be performed to accomodate our growing hardware complement.

*UNIX is a trademark of the Bell System.

BNR is the U.S. subsidiary of Bell-Northern Research, the development organization for Bell Canada and Northern Telecom. We offer excellent compensation, outstanding benefits, a professional and attractive working atmosphere, generous relocation assistance, and continuing opportunities for personal recognition and professional growth.

For immediate consideration, send resume to Tom Levejoy, Recruiting Manager, BNR INC., Mail Stop 126, 3174 Porter Drive, Palo Alto, CA 94304. An equal opportunity employer, M/F.

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We need an experienced Senior Systems Analyst and highly qualified Programmers to design, document, and implement a total emergency response system for Metro Dade County, which encompasses 911 and centralized complaint operations, and computer assisted dispatching for all emergency services. System will process on a distributed PDP 11 network, and design experience and assembly programming for DEC PDP 11 or similar equipment is essential. Experience on IBM equipment and COBOL/FORTRAN programming is desirable. Salaries range from $16,720 to $21,180 (Senior Systems Analyst) and $14,590 to $18,290 (Programmer).

We offer the challenges and diversity of information requirements in metropolitan government, the rewards of a career in the public service, the advancement opportunities of a large (190 employees) and rapidly growing organization, competitive salaries, and the potential for the good life that the Miami area offers. Send resume to:

**Director, Office Of
Computer Services
and Information Systems
(Attn: 911/CAD
Project Coordinator)
Metropolitan Dade County
73 W. Flager St. (Room 1901)
Miami, Florida 33130**
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# Computer Architects: Good Reasons to Make a Move to Amdahl

Amdahl has a lot to offer good people ready to take a positive step toward upgrading their careers and work environment.

You will find the enthusiasm, excitement, and friendliness contagious. You might even find your work being fun, as most of us do. That's how, in just seven years since our founding, we have earned an international reputation as builder of the most advanced large computer systems. That's how, in just two years since our first shipment, we have delivered a quarter of a billion dollars worth of computers to the world's major companies and institutions. We are, in fact, making historical inroads in an industry where the competition is highly competent.

Our Systems Architecture group seeks talented professionals to help design future high-performance computer systems. You should have a broad educational background in EE or CS with emphasis on computer architecture or design and be familiar with most of these areas: computer systems organization; storage systems organization; operating systems theory; assembler/high-level languages; data base fundamentals. Combined hardware and software experience and familiarity with system 370 is desirable. The following positions represent some of our more immediate needs; perhaps one of them is a good reason for you to make a move to Amdahl.

## SENIOR SYSTEMS ARCHITECT

You will be a key decision maker on an architectural team. You have experience in either computer systems or operating systems architecture or design.

## CONSOLE AND MAINTENANCE ARCHITECT

You will be responsible for the design of system consoles and work on system maintenance strategies. You have experience or aptitude in most of these areas: small and large computer systems, diagnostics, small operating systems and project management.

## STORAGE SYSTEMS ARCHITECT

You will be key in defining the architecture of future storage and data base sub-systems. You have experience in either of these areas.

## SOFTWARE SYSTEMS ARCHITECT

You will be a software systems specialist on an architectural team. You have an architectural orientation and experience with operating systems/data base, preferably on system 370.

## SYSTEMS ARCHITECT

You will be a member of an architecture team working on diverse investigations. This position offers tremendous educational and advancement opportunities. You have at least 2 years' related experience or the equivalent.

## SYSTEM PERFORMANCE ARCHITECT

You will be the performance specialist on an architectural team. You are a qualified professional in computer system performance measurement, evaluation and modeling with emphasis on architecture or design. Research into key areas of new product development will be a major responsibility.

## PERFORMANCE MEASUREMENT SPECIALIST

You will be responsible for the development of measurement methodologies to provide the measurement support of future product development. The position requires broad experience and knowledge of computer system operation, measurement methods and system modeling.

## WORKLOAD SPECIALIST

You will be responsible for research of computer system workload classification and analysis, including workload creation and synthesis. Research ability in the areas of performance measurement and evaluation is necessary.

We're looking for exceptional talent. You can expect an exceptional compensation and benefits package. Please direct your response to Manager, Professional Employment, Amdahl Corporation, 1250 East Arques Avenue, Sunnyvale, CA 94086. To expedite your application, please indicate 416-E on your resume or letter. We are, of course, an equal opportunity employer.

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National Book wholesaler has immediate opening for newly established D.P. position. Applicant must have the following qualifications:

High level of proficiency in S/3 Disk RPG II.

Solid hands-on experience on S/3 Model 15.

Design/Programming experience with applications designed to run under CCP (on-line 3270 experience desirable). Submit letter of application including resume. Excellent salaryand relocation pay.

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2+ yrs. COBOL and ASSEMBLER with CICS experience plus $18K F.P.

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Requires Data Base Mgmt, D Bomp and MRP experience

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# PROJECT SYSTEMS ENGINEERS.

Aramco needs five Project Systems Engineers who are the very best available in their field. Your permanent assignment would be in Saudi Arabia where Aramco has projects under way whose size and scope are unequalled in the world today.

### The job.

You would be working on the world's largest computer automated system for controlling the movement of crude oil, NGL, and natural gas. This system will control the world's largest crude oil pipeline network and marine terminal and one of the world's largest refineries with the software system coordinating Aramco's entire production. It is to be the ultimate in computerized systems for moving petroleum products and presents to those Systems Engineers who can qualify, the greatest challenge of their careers.

### The requirements.

We are looking for engineers who have B.S.E.E. or M.S.E.E. degrees, the latter being preferred. You must be project-oriented and have a minimum of 5 years' experience in real time computer systems for the pipeline or process control industries.

Your first assignment will be in Houston for approximately 18 months working as Aramco's representative with a major contractor who is developing the engineering design proposal. Here you will overview the design and installation of all hardware and software for the entire project, making sure it meets Aramco's specifications. At the end of the design phase you will then be permanently transferred to Saudi Arabia, where you will oversee the installation, acceptance testing, and continued operations.

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Besides the challenge and career opportunities of your job, working for Aramco overseas offers several excellent advantages. You'll receive a good salary and savings plan, plus a generous tax-protected expatriate premium.

And you can travel the world if you wish, because on the average of every 12½ months you receive 40 fully paid vacation days, as well as round trip vacation travel fare to the U.S. Add to this an average of 12 paid holidays each year. In addition, Aramco offers a comprehensive medical program and a generous retirement plan, plus excellent recreational facilities.

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428 Forbes Avenue
Pittsburgh, Pennsylvania 15219

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San Francisco, California 94111

**SYRACUSE**
CFA Associates Personnel, Inc. (Agency)
2530 James Street
Syracuse, New York 13206

**TULSA**
Data Processing Careers, Inc.
Suite 10, Park 21 Building
2626 East 21st Street
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## SOFTWARE SYSTEMS PROGRAMMER POSITION

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**Contact VIP & SU Personnel Department, Burruss Hall, Blacksburg, VA 24061.**

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## PROGRAMMER ANALYST

Continuing expansion has created an immediate need for a Data Processing Professional. THe Evanston Hospital, located in north suburban Chicago, is a multi-site health care organization affiliated with Northwestern University McGraw Medial Center. This position requires 4 years Programming experience with at least 2 of them being with IBM/370/ DOS/VS and ANS/COBOL/VS. Experience in the following application areas desirable:

**- Financial Systems; - Order Entry; - Billing; - Inventory**

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EOE M/F

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**(Large-Scale IBM environment;**
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# Large-Scale Opportunities in Advanced-Technology EDP Systems Development

## SENIOR SOFTWARE SPECIALISTS

Several positions are currently available consisting of the development of a very large distributive processing system and will include advanced state-of-the-art technology. Will utilize the entire spectrum of EDP equipment from mini's to large mainframe and a large assortment of associated peripherals and other devices, i.e. terminals, etc. Minimum of 5 years' experience in the development of systems software with the preponderance of this experience in telecommunications, networks and file processing, plus a background in operating systems, plus expertise in COBOL and assembly languages necessary with strong preference for a related degree.

## DISTRIBUTIVE PROCESSING SYSTEM DEVELOPMENT

Positions are available in the development of a very large distributive processing system, advancing the state-of-the-art technology utilizing the spectrum of EDP equipment — minis to large mainframe with assorted peripherals and terminal devices. Experience in telecommunications, networks, file processing or operating systems plus expertise in COBOL.

## COMPUTER SYSTEM PERFORMANCE ANALYST

A newly created position exists for a person who will specify performance goals and implement methods to assure goals are met for ON-LINE SYSTEMS. Additionally, specify performance instrumentation and monitor system performance throughout system development, and develop system performance models. We feel these tasks can best be performed by someone who has had some experience in system performance evaluation and transaction processing systems. Knowledge of, or work with synthetic benchmarks, data processing systems and system performance instrumentation would be an asset.

If you are interested in being considered for one of several new positions with us, please send your resume and salary history/requirements to Thom Harris.

**NCR**

Special Systems Division

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Experience NCR Century Programmer. Salary commensruate w/experience. Excellent company paid benefits incl. free lunch and parking. Ample prime shift test time. Send resume or call:

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UNIVERSITY OF VERMONT

## *SENIOR SYSTEMS ANALYST*

The Office of Management Information and Computing is seeking a Senior Systems Analyst to coordinate the design and implementation of administrative applications under our integrated data base. Applicants must have a bachelor's degree and at least five years of DP experience, three as a Systems Analyst. Experience in COBOL and IBM/DOS are required. Applicants with higher education experience in on-line systems and DBMS are preferred. We offer an excellent benefits package; salary will be in the upper teens. Send resume and professional references by August 15 to the Personnel Department, Box 57Y, Waterman Building, University of Vermonth, Burlington, Vermont 05401.

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## SYSTEMS ANALYST

Three years systems and programming experience in manufacturing environment. Must be knowledgeable in design and implementation of major systems including cost justification, systems studies, scheduling and project reporting. Bachelor's degree or equivalent experience required.

## SR. PROGRAMMER ANALYST

Three years application programming experience; proficiency in DOS/VS, power/VS, JCL, utilities, degree or equivalent experience required. Knowledge or experience in PL/1, CICS, LIBRARIAN and DBOMP desirable.

We offer compensation and benefit plans in an attractive Ohio community ideal for family living. Please send resume identifying job of interest to J.A. Renard, Diamond Power, The Babcock & Wilcox Company, P.O. Box 415, Lancaster, Ohio 43130.

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The Psychology Department at Carnegie-Mellon University is looking for someone with a background in electrical engineering and programming to develop, manage, and maintain its computer laboratories. The following three qualities are desirable: (1) knowledge of systems and assembler-level programming (especially RT-11, RSX-11M, and MACRO 11) with an emphasis on real-time programming; (2) ability to do hardware design, construction, and maintenance; (3) experience with PDP-11's. Salary $11,000-$16,000, depending on qualifications.

Send resume to Marcel Just, **Psychology Department, Carnegie-Mellon University, Pittsburgh, Pa. 15213, or call (412) 621-2600, Ext. 483.**

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## SAN DIEGO

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Equal to college grad and 2 years in systems analysis, design AND programming in ANS COBOL, JCL, OS, (rel. 21 or higher), environment. May substitute additional OS or DOS experience in an environment equal to or greater than IBM 360-50 or 370-145 for up to 2 years college.

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This growth position extends responsibility for generating and maintaining computer operating systems and supporting software systems. For consideration, candidates must have a Business or Computer Science degree with 3 years experience in either: applications programming, systems programming or technical support analysis. Background should demonstrate broad experience with IBM 370 equipment and systems development in OS/VS .1 and solid assembler language programming ability. Telecommunications software installation and/or Data Base Management experience desirable.

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Your strong suits should emphasize auditing procedures, report writing, IBM systems, with strong interest in interfacing with management. Send your resume with salary history, in confidence, to C.W. McTyer, Room 802G

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Position requires technical background in IMS data base design, DBDGEN, PSBGEN and IMS utilities. Responsibilities include heavy user interface, system integration, performance analysis, design and generation of data base control blocks. Good communication skills essential.

*If you are interested in exploring these exciting career opportunities, send your resume and salary requirements to:*

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# CPU Process Engineering

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During this year to new modules production facilities will be opening. The tremendous demand for DIGITAL products and the recognized leadership of Digital Equipment Corporation in the information processing industry created a strong demand for additional personnel. Focusing on the CPU manufacturing process, we seek an experienced TEST ENGINEER who is new products-oriented. This person will define the test philosophy and process flow for incoming, module and unit test process. The introduction of a new product into the manufacturing facility will be the project goal. This is an outstanding opportunity for a Test Engineer with proven credentials in the computer or peripherals equipment manufacturing process.

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Develop assembly strategies for CPU production. Knowledge of module, unit and sub-assembly processes required. Automatic CPU assembly experience also desired. Digital's highly automated manufacturing and assembly operations create a real challenge for an aggressive, experienced Manufacturing Engineer. CPU assembly experience is a must. Process orientation is very desirable. This position offers an individual a high degree of visibility within the high volume manufacturing world of Digital Equipment Corporation. Relevant work experience combined with project management and a technical degree will qualify you for this position.

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Please forward your resume noting the newspaper and the date and position desired to: David Crowley, Digital Equipment Corporation, 97 Piper Road, Acton, Massachusetts 01720. We are an equal opportunity employer, m/f.

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# COBOL PROGRAMMER

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Monterey, CA 93940

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# Research Department
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## ADMINISTRATOR

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We are seeking experience on IBM 360/OS in any one of the following areas:

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Enhancement of data reduction and analysis system OS/360 System generation and maintenance

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BAL and/or high level language (preferably JOVIAL) experience highly desirable.

Positions are located in Jacksonville, Florida.

## SPACE SCIENCES

Current positions in support of Goddard Real-Time System, Space Tracking Data Network and On/Off Site Project for the NASA Goddard Space Flight Center require a degree in Computer Science, Math, Physics, Astronomy, Meteorology or Engineering with experience using Fortran and/or Assembly languages on large-scale or mini-computers. These skills will be applied in the following concentrations:

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- Integration and testing of real-time display software
- Data base management
- Real-time scientific applications
- Network management
- Computer-to-computer communications
- System requirements definition
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- Simulation/modeling of real-time systems

CSC offers a liberal relocation policy in addition to complete benefits package. For immediate attention, please send resume or call:

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Direct operational, financial and personnel activities of a DEC 1080 system computer center serving the instructional and administrative needs at a university enrolling 13,300 students. Position reports to the Office of Vice President for Planning and Policy. Responsibilities include continued development and refinement of systems to meet short and long range MIS needs, research new techniques, hardware and software for on-line system, direct activities of a staff of 30 in programming and documentation, review and approve purchases and leases. Position available August 15. Qualifications required: 5 years in all phases of data processing including managerial experience, ability to interface with all levels of management. Applicants are expected to prove success in implementing systems utilizing on-line communications and data base software. Must be knowledgeable in academic and administrative computing in higher education. B.S. degree in related field, Masters preferred. Salary commensurate with experience. Send resume to Fred H. Wise, Office of Vice President for Planning and Policy,

Old Dominion University
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# MARKETING MANAGER
## Mail Order Software

University Computing Company, an internationally recognized leader in data processing software and services, is currently accepting applications for the position of Manager of Mail Order Software. The individual selected will assume the overall sales responsibility of UCC system aid products including market research and preparation and product search, promotion, and sales. This position, based at the Company's home office in Dallas, will involve limited travel. Salary level is in the mid-twenties.

To be considered, an individual must have an in-depth knowledge of the operation of large IBM data centers and be technically well-versed in IMS. Marketing/Sales experience also required.

Qualified parties should rush a detailed resume, including salary history, to: Henry Oliver, University Computing Company, P.O. Box 47911, Dallas, TX 75247. All replies will be treated confidentially.

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# PROGRAMMER/ANALYST
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Newspaper group has an immediate opening for an individual with knowledge of DEC PDP-11 with RSTS, RSX or IAS operating systems. Will be responsible for development, installation and maintenance of business systems in the BASIC PLUS and BASIC PLUS 2 programming languages at local newspaper sites.

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You will have complete project responsibility from initial conceptual design, testing through integration with in-house minicomputer systems.

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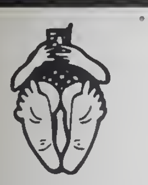

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FINAL FILING DATE: August 12, 1977

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Direct this project oriented group in defining and implementing test tools and test techniques for modular assemblies. Expertise in microprocessor test techniques and LSI-in-circuit test design required. You will be providing guidance and expertise to manufacturing and assembly locations in implementing new test processes. You must be capable of conceptualizing and developing the strategies in a terminals manufacturing environment, understanding the impact of proposed strategy on the production process. You must be aware of the latest state-of-the-art test equipment design and possess a working knowledge of microprocessor test equipment such as Intel 8080 or Tektronics. Your advancement potential within this top Fortune 300 company is assured if you possess a dynamic personality, a strong theoretical background and solid manufacturing experience.

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Organize and direct a design engineering group to design dedicated test equipment for high volume manufacturing. Digital's terminals manufacturing capabilities are increasing rapidly as we continue to expand our highly automated production facilities. Our test equipment needs continue to be a high priority for additional expansion. For this postion a progressive design engineering background, supervisory experience and solid educational credentials are required. Knowledge of peripherals test equipment design is essential. Familiarity with manufacturing environment and terminals production processes a strong plus. Advancement withn the Process Engineering Group or into Central Engineering are distinct possibilities. Your progress will be measured on direct contributions to the corporation.

Please forward your resume noting the newspaper and the date and position desired to: David Crowley, Digital Equipment Corporation, 97 Piper Road, Acton, Massachusetts 01720. We are an equal opportunity employer, m/f.

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## COMPUTER PROGRAMMER

Background should include Bachelors Degree in Computer Science or closely related field plus 1 to 3 years Fortran and/or Assembler in real-time environment experience. Familarity with Xerox Sigma 3 or DEC PDP-11 desirable. Computer to computer experience a plus. Position involves communications software development in Electrical Power System monitoring, control, energy production and energy accounting. Must be willing to relocate and/or travel extensively first 2-3 years. Eventual relocation in Central New York State. This career position is with Power Authority State of New York Production Control Center. Send resume in confidence to: Power Authority of the State of New York, P.O. Box 277, Niagara Falls, New York 14302, Attention: E.F. Bridler

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Immediate opening for an experienced programmer/analyst.

Position requires at least one year of CICS application programming experience, a very good knowledge of IBM Assembler Language and experience in systems design. Also prefer experience with DBOMP, BOMP and/or DL1. Knowledge of PL1 and/or COBOL programming language is helpful. Salary commensurate with experience and abilities.

Qualified candidates should reply in confidence with resume to:

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The Trane Company
1500 Mercer Road
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## DIRECTOR OF COMPUTER SERVICES

Computer Services provides all academic and administrative data processing support for an urban university of over 17,000 students. The university operates a PDP-11 timesharing system and shares a UNIVAC 1110 and an IBM 360-75 at the Levis Regional Computer Center. The director is responsible for all campus hardware and software planning, system development administrative supervision of a staff of 30, budgeting and coordination of processing requirements among the various computers. Also, the director will be expected to participate in specific technical projects, develop in-service training and interact professionally with the staff of the Regional Center.

Preferrable: 5-10 years supervisory experience in a comprehensive computer installation, and a broad background in university academic and administrative computing or the industrial equivalents. $24,000 to $27,000 plus an attractive benefit package.

Submit complete resume, including salary history and references to:

**Dr. DeForest L. Trautman**
**Director, Mgmt. Information Services**
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**Toledo, Ohio 43606**

Deadline: August 15, 1977

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**APPLIED DATA RESEARCH**
**Route 206 Center, CN-8**
**Princeton, N.J. 08540**

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## DIRECTOR ADMINISTRATIVE PROGRAMMING SERVICES

Clemson University is seeking a director for administrative data processing. Responsibilities include systems analysis, programming, and implementation of university-wide management information system. Staff of approximately 25 programmer/analysts including clerical staff are developing on-line systems and using IDMS data base software. All systems operate on an IBM 370/165-II under MVS. Candidates must have a bachelor's degree in an area related to data processing and financial management sytsems, master's degree preferred, at least five years experience with supervisory responsibility and a working knowledge of teleprocessing and data base technology. Salary 20K to 25K depending on qualifications. Apply before July 29, 1977 to:

DAPS Search Committee, c/o Graduate School, E-106 Martin Hall, Clemson University, Clemson, S.C. 29631.

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# EDP CAREERS

The Data Processing Division of DORSEY LOVE & ASSOCIATES offers a personalized and professional service to the computer professional seeking to advance his career. We serve the Data Processing field from coast-to-coast and keep abreast of the current employment situation through constant contact with employers and our affiliates. To the person seeking to advance his career, this means a confidential job search on a continuing basis. To the employer, this means a reliable source to turn to when seeking to fill a key position. We currently have career opportunities for highly qualified programmers, programmer/analysts, systems analysts, design and software specialists, and management professionals in business, industry, and the scientific fields. If you feel that now is the time to further your career, send your personal resume or call Jeff Holmes today. All inquiries held personal and confidential.

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Springfield, Missouri 65804
(417) 883-1212

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# SENIOR PROGRAMMER ANALYST

We are seeking an individual who will perform systems analysis and write applications programs. The position requires a degree in Computer Science or a related field, a minimum of 3 years manufacturing experience and well developed human relations skills. A good working knowledge of ANSI COBOL is essential. An understanding of ASSEMBLER (BAL) and a working knowledge of IBM equipment is desirable.

Send resume in confidence to G. Teich, Industrial Relations Department.

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Perform emergency and preventative maintenance on our Xerox Sigma 9 and 940 Computer Systems with High Speed RADS Disk Units, Magnetic Tape Units and Line Printers attached to the Central Processor.

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Three years experience maintaining Computers and Computer Peripherals. Experience on Xerox Sigma 9 and or 940 Systems is desirable.

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Due to expansion Datapoint Corporation has openings for the following categories of professionals at its sales offices in Chicago, Ill., Springfield, Ill. and Milwaukee, Wis.

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Should have 3 to 5 years programming experience with some business data communications background. Should have good experience in sales support, software/hardware consultant services to customer firms using business computer systems.

### ACCOUNT MANAGERS

Should have 3 to 5 years successful sales experience with a computer hardware or service company. Knowledge of communications and business-oriented applications and systems desirable. Will be responsible for developing, maintaining customer relationships.

These positions offer excellent salaries and benefits, opportunity for rapid advancement into management and a challenging work environment. Datapoint needs individuals who can respond to the demands of its rapid growth. Applicants for Systems Engineers position may call **Mr. R. K. "Kip" Andersen at (312) 298-1240,** while those for Account Manager openings should call **Mr. Peter Piper at the same number, or send resumes with salary history to Datapoint Corporation, c/o Messrs. Andersen or Piper, 2340 Des Plaines Ave., Suite 205, Des Plaines, Ill. 60018.**

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DATAPOINT CORPORATION

The leader in dispersed data processing™

# SYSTEMS SOFTWARE POSITIONS

Harris Computer Systems, a manufacturer of medium scale digital computers has the following positions available in our Fort Lauderdale location.

## SOFTWARE TECHNICAL WRITER

To research, write and edit reference and user manuals pertaining to systems software. We prefer applicants who have technical writing experience, preferably in software coupled with a broad range of programming expertise. A degree in Computer Science or English plus 2 years in industrial software technical writing is desirable.

## OPERATING SYSTEMS PROGRAMMERS

To design and implement operating systems for medium scale computers. Applicants should have assembly language programming experience and a background in implementation and maintenance of a mini or medium scale computer operating system. Hands-on hardware experience is required. A Bachelor of Science with 0-2 years work related exposure are factors which will be considered.

Send your resume in confidence to W.D. Taylor, Harris Corporation, Computer Systems Division, 1200 Gateway Drive, Fort Lauderdale, Fla. 33309.

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(When writing, please be sure to indicate home address and current position title.)

If unable to call, write:
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Department C
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Oak Brook, Illinois 60521

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# sales engineers and field analysts

## This way to a better future...

Sperry Univac, the name alone is synonymous with quality and this kind of reputation means rewarding opportunities for minicomputer professionals who expect enrichment from their career.

We are committed more than ever to becoming a major force in the minicomputer industry and with our V-77 series computers, which are used in the real-time marketplace for Data Base, Data Communications and Distributed Processing applications, we intend to make that commitment a reality through the hiring of technically-oriented, top professionals.

Our standards are very high, so to attract the caliber of people our product line demands, we offer a great deal more . . . more in areas such as an environment to explore new ideas and applications, or if you're a sale pro, a very aggressive commission plan. We intend to double in size within the next 12 months, so the opportunities to advance into management are almost unlimited. If this sounds like the kind of opportunity you've been waiting for, we suggest you contact the nearest office listed below.

## Sales Engineers

We have openings throughout the United States for top closers with a minimum of 3 years experience in the real-time, Data Base, Data Communications and Distributed Processing marketplace. You should have a strong technical command of both hardware AND software, and a successful track record in the minicomputer industry.

## Field Systems Analysts

Sperry Univac field analysts have a key responsibility in marketing headquarters interface and sales/proposal preparation and service support. A technical degree is desirable, but creative, problem solvers are a greater asset to our sales force. A minimum of 3 years pre and/or post sales support in real-time commercial (Data Base, Data Communications, Distributed Processing) and/or real-time scientific applications is required.

Los Angeles, San Diego and Phoenix
call: 714/897-9515 or 213/598 4438

Dallas, Houston and Orlando
call: 214/231-5145

Boston and Rochester
call: 617/890-6072

San Francisco, Denver and Seattle
call: 408/736-5630

Chicago, Detroit and St. Louis
call: 312/692-7184

New Jersey, Manhattan and
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MINI-COMPUTER OPERATIONS
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### ENGINEERING SYSTEMS ANALYST

Investigate requirements of design engineers for DP analysis, design and drafting systems for a varied, highly engineered product range. Design and develop required DP systems. Excellent growth potential. Minimum qualifications: 2 yr. experience in engineering systems and analysis, BS in engineering, proficient in FORTRAN. Communication ability a must. Experience with OS, interactive systems, and COBOL are pluses. Send resume and salary requirements in confidence to:

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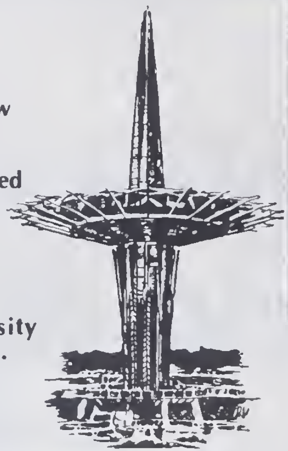
## COMPUTER SYSTEMS ANALYST



Oral Roberts University, Tulsa, Okla., is seeking an aggressive, highly skilled person to take an important role in developing new campus systems. Prefer 3 to 5 years experience in systems design with on-line terminal-based systems. Salary commensurate with experience.
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Write: Personnel Office
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## PROGRAMMERS

Dynamically growing Regional Data Center in Albuquerque, New Mexico, using 370 DOS/VS POWER, needs programmers experienced in:

**COBOL**
**RPG II**
**Teleprocessing**

Please send resume to:

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## TECHNICAL BOOK EDITOR

### NEW HAMPSHIRE

Entry position with division of leading personal computing publication. Responsible for coordination, editing and producing technical material in book form directed to computer science market. Editorial contents of books include software documentation packages with theory, tutorials, and related manuscripts on electronics and engineering aspects of computers. Ultimate responsibilities will lead to management of technical book publishing operations. One-two year experience in computer science application required. Editorial skills plus intelligence, judgment and maturity essential. Enthusiastic interest in computing highly desirable.

We are BYTE Publications, Inc., Peterborough, N.H. We publish BYTE Magazine (over 100,000 circulation), the leading publication, serving the field of personal computing. We pioneer new ideas in the publication of software for computers through magazine and book operations.

We offer full medical insurance, life insurance and the benefits of a small company with close communication among professional and business staff. Attractive small town nestled in Monadnock region of New Hampshire with many local recreational opportunities plus strong fine arts tradition with McDowell Colony, nearby Apple Hill Chamber Players and numerous craftspeople. Boston is 1½ hours away. Starting salary $15,000 with a six month performance review and reasonable relocation expenses.

BYTE

Send resume to: Carl T. Helmers, Jr., Editor in Chief, BYTE Publications, Inc., 70 Main St., Peterborough, NH 03458.

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## Professional Computer Services Openings at Michigan Technological University

Michigan Tech is a leading engineering University located at Michigan's Upper Peninsula at Houghton, Michigan. Michigan Tech provides a professional environment utilizing state of the art technology, excellent benefits including 24 days vacation, paid retirement and insurance, and small town living in a year round recreation area. The following positions work primarily with a large scale UNIVAC 1100 mainframe.

**Senior Systems Programmer/Analyst:** Multi-lingual (FOR, COB, ASM) with diverse background for special projects on micro, mini and large scale systems.

**Senior Systems Programmer/Analyst:** UNIVAC experience required to maintain EXEC-8, monitor system performance, design and develop associated support software.

**Administrative Programmer/Analyst:** Data Base/Math/COBOL to develop and support applications in Institutional Analysis.

**Academic Systems Analyst:** Multi-lingual (FOR, COB, PL1) with math/stat background to consult in the academic user community, supervise support programmers and maintain program libraries.

**Administrative Programmer:** Data Base/COBOL experience required to develop and maintain programs for Administrative Departments.

Send resume with salary requirements in confidence to:

**Vance B. Nelson, Manager**
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## TECHNICAL DIRECTOR OF DATA PROCESSING
### NATIONAL OPINION RESEARCH CENTER

NORC is a not-for-profit social science survey research organization affiliated with the University of Chicago, with central office in Chicago and a New York office. NORC employs 300 persons, and a large national field staff is maintained.

Immediate opening for Technical Director of Data Processing, based in Chicago. This position plans and supervises the activity of 15 to 20 employees in NORC's data processing departments in Chicago and New York. Specific duties include:

planning and evaluation of software for eventual importation or internal development; development and operation of data base entry and editing facilities; planning and decision-making in the area of proposal development and proposal writing; responsibility for Data Processing budgeting and budget management; interaction with operations and administrative staff of organization.

Requirements include: some post-BA education in computer science or a related field desirable; an MBA, MA, or equivalent ideal. Work experience with data processing, ability to design and evaluate software, and writing skills essential. Familiarity with IBM 370/OS and some exposure to on-line systems essential. FORTRAN essential, PL/1 desirable, and some exposure to Assembler language useful.

Salary range from $18,000-$25,000, depending on experience. Submit resume to:

**Garth Taylor, Chairperson**
**DP Director, Search Committee**
**Nat'l. Opinion Research Center**
**6030 S. Ellis Avenue**
**Chicago, IL 60637**
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SEPT '77 OPENING

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## PROGRAMMER/ ANALYST

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The Supreme Judicial Court of Massachusetts requires a junior programmer to create new computer applications and maintain existing applications under the direction of Systems Analysts. This innovative and challenging work is in a newly organized office which offers excellent growth potential. Previous experience in COBOL and IBM JCL 370/145 is preferred. The successful applicant will have the ability to express ideas clearly both in written and oral communications plus one years experience in computer programming or 2 years college level course work in programming. Salary from $12,500.
Send resume and salary history to:

"Junior Programmer"
**Dana Owens**
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**301 New Courthouse**
**Boston, Mass. 02108**

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## SYSTEMS PROGRAMMER
### Cleveland Suburb

**ENVIRONMENT**

* Large manufacturing organization, eastern suburb, pleasant working location
* Excellent salary and fringe benefits; 3 week vacation after one year
* Dual IBM 370/158, 3330-11, 3350, 6250 tape
* OS/VS I, MVS, VSAM, task/master, RJE
* Excellent career growth opportunity

**QUALIFICATIONS**

* Thorough knowledge of COBOL and BAL
* Extensive OS job control language experience
* Working knowledge of operating systems and hardware concepts
* Experience in major access methods including VSAM
* On-line systems design experience desirable

Please send resume with salary history to:

**CW Box 5118**
**797 Washington St.**
**Newton, Mass. 02160**
*Equal Opportunity Employer M/F*

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## Data Processing Opportunities

JOHN DEERE

John Deere, a dynamic organization is currently seeking talented individuals for our expanding plant facilities. As a leader in the basic and stable argicultural industry, we can offer individual career development and growth opportunities. We currently seek the following individuals:

### SYSTEMS ANALYSTS

Knowledgeable in COBOL and FORTRAN with an IMS background from a manufacturing environment. Previous experience as a Systems Analyst preferred, but not necessary.

### PROGRAMMERS/Software Specialists

Previous experience with COBOL and FORTRAN, and Mathematics Computer Science education are required.

### NC PROGRAMMER

2-5 years experience in NG programming with experience in APT. Degree not required.

We offer the selected applicants top salaries, complete employee benefits and paid relocation to Iowa. Please submit resume, including salary history to:

Ronald H. Like
Manager, Professional Employment
Deere & Company
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## SYSTEMS ANALYSTS AND PROGRAMMERS

### *Put Your Experience To Work For You In Building A Better Career Opportunity*

Sperry Univac has several challenging opportunities waiting for you at our Minneapolis location. These positions are open in the following areas:

- acceptance testing of application programs
- technical support of customer airlines
- design and implementation of air cargo systems

These positions also require a combination of experience in any of the following: airline applications development; on-site implementation and support; Fortran; air cargo application; technical customer liaison; and/or a familiarity with the Univac 1100 Series and Univac 1100 DMS.

We offer highly competitive starting salaries, a comprehensive benefits program and outstanding professional and personal growth opportunities.

**FOR IMMEDIATE ATTENTION, PLEASE CALL COLLECT OR DIRECT YOUR RESUME TO:**

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To participate, you MUST register. Call Cybersearch any weekday 9 A.M.-9 P.M. Out-of-towners call for interviews. For reasons of confidentiality, if your current employer is an attending company, we will notify you immediately.

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## EDP PROFESSIONALS

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Major Financial Firm seeks individual with strong quantitative bkgd & exp with finc'l or production oriented concern to solve major business problems & develop long-range operating plans.
- **Data Base Mgmt** **$38K**
Major MNC seeks a professional currently in the capacity of data base Mgr/Admin for a major user. Will have responsibility for managing D.B. activity in its entirety. Liberal relocation policy.
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Exceptional learning & promotional opty exists with this major client for intermediate level analysts (with coding skills) who seek more challenge & want to work in a fast-track environment.
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We seek inquiries from outstanding Programmers wishing to advance their status/income while adding to their hardware/software kldg. Our major clients in the NY tri-state area (listed exclusively with us) have several very attractive openings.

*For information on these & other career positions, please call or send letter/resume in confidence to:*

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**the jarvis walker group**
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**Marshall Field & Company**

## CHICAGO
## INFORMATION SYSTEMS

Marshall Field & Company seeks qualified individuals to fill a number of expansion programming positions. We currently have installed two Univac 1106-II unit processors. An upgrade to a Univac 1100/82 multi-processor is scheduled for Spring, 1978. This is an opportunity to join a highly professional staff in developing comprehensive retail information systems. In addition to excellent salaries, this program offers good growth potential with a world famous firm.

The following positions are available:

### PROGRAMMER ANALYST

Should have a minimum of 2 years experience in business applications using COBOL or ASSEMBLER on Univac Equipment.

### SYSTEMS SOFTWARE PROGRAMMER

Should have a minimum of 2 years experience with large scale operating system software. Experience with Communications software or File Management systems is also desirable.

**Please send resume, including salary requirements and references to:**

D.J. Spapperi
Manager, Systems Development
Information Systems Division, 10MW
Marshall Field & Company
111 North State Street
Chicago, Illinois 60690

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## Director of Corporate Systems

Booz Allen & Hamilton continues its growth in the management consulting industry. Our rapid expansion has created an opening in our Corporate Internal Financial Group, located in north central New Jersey, for a Computer Systems Professional interested in enhancing our development through the conceptualization and introduction of a centralized corporate systems capability.

The ideal candidate should have extensive experience in the development of business systems including key resource management, marketing, and finance – which should be coupled with a varied hardware background including mini computers. In addition, it is vital that your communications skills be considered an asset to the Systems Development process.

This position is designed to have a significant impact on our internal management systems and offers a compensation package equal to that task.

**Please forward your resume in confidence to: R.W. Apple**

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66 Hanover Road Florham Park, New Jersey 07932
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## Programmers and Analysts

### San Francisco Bay Area

Professionals position requires technical skills including COBOL or ALC under MVS-IMS. You should be a problem solver with a sharp analytical mind sensitive to user requirements. You should require minimum supervision and have approximately 2 years working experience.

If these criteria match your profile, you may be eligible for significant career development in a state-of-the-art environment with attractive fringe benefits and a salary to $20,000.

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## SOFTWARE PROFESSIONALS

We are seeking creative programming wizards who have at least 2 years experience in assembly language and higher level language(s) (FORTRAN, COBOL, PL/I or BLISS). They should also have an understanding of indexed file structures and operating system logic related to I/O requests. Experience with or strong interest in data base management systems is a must. PDP-10 experience would be helpful, but is not required.

Responsibilities and job functions include design, implementation, maintenance and enhancement of software related to our CODASYL based DBMS. Pursuit of interests in other systems areas (e.g., compilers) is encouraged.

Excellent opportunity for professional and personal growth. Good benefit prorgram. Salary 16K - 25K commensurate with ability and experience.

Contact our personnel manager for appointment, or send resume to:

**CompuServe**
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## SENIOR SOFTWARE ANALYST

At Warwick, Rhode Island where we will be installing a CICS System.

We are an international manufacturer of machinery seeking an individual who will assist in the installation of a CICS System. The person will also be responsible for modifying and maintaining our operating systems. (IBM-370-145, PDP 11/70).

A thorough understanding of ASSEMBLER (BAL) and a working knowledge of ANSI COBOL are essential. A related degree and, at least, four years manufacturing experience are required. Candidates who have DOS/VS CICS experience and exposure to an IBM operating environment will be given preference.

Send resume in confidence to G. Teich, Industrial Relations Department.

LEESONA CORPORATION
333 Strawberry Field Road
Warwick, R.I. 02887
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COMPENSATION TO $50,000
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(301) 657-3510

If a call is not convenient, we invite you to forward, in confidence, a brief letter or resume outlining your qualifications and career interests to:

Personnel Consultants
7101 Wisconsin Ave., Bethesda, MD 20014
DAVIES ASSOCIATES, INC.
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## DIRECTOR, SYSTEMS DEVELOPMENT

Oberlin College, a private liberal arts college with a FTE of 2700 students, located southwest of Cleveland, is seeking a Director, Systems Development. The Director will be responsible for the supervision of personnel whose mission is to conceptualize, develop, test, document and maintain administrative systems. This position reports to the Director of Computing. Present equipment is a HONEYWELL Sigma 9 operating under CP-V.

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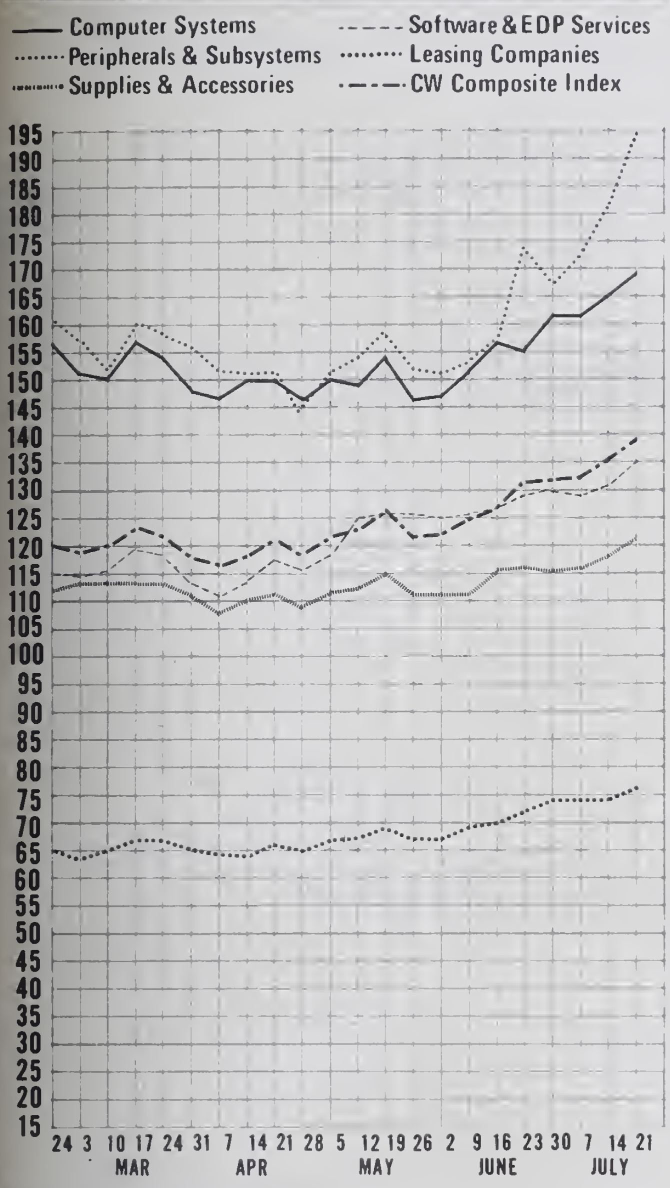
## COMPUTERWORLD Computer Stocks Trading Indexes



# Earnings Reports

**SANDERS ASSOCIATES**
Three Months Ended April 29

| | 1977 | 1976 |
|---|---|---|
| Shr Ernd | $.16 | $.25 |
| Revenue | 36,914,000 | 41,625,000 |
| Disc Op | 1,466,000 | (840,000) |
| Tax Cred | .... | 411,000 |
| Eernings | 3,257,000 | 1,134,000 |
| 9 Mo Shr | ..... | .79 |
| Revenue | 109,164,000 | 128,541,000 |
| Disc Op | (14,028,000) | (2,740,000) |
| Tax Cred | ..... | 1,141,000 |
| Eernings | (8,619,000) | 3,567,000 |

**TALLY**
Three Months Ended April 3

| | 1977 | 1976 |
|---|---|---|
| Shr Ernd | $.21 | $.19 |
| Revenue | 6,433,000 | 6,112,000 |
| Tax Cred | 182,000 | 378,000 |
| Earnings | 568,000 | 658,000 |

**UNITRODE**
Three Months Ended April 30

| | 1977 | 1976 |
|---|---|---|
| Shr Ernd | $.26 | $.20 |
| Revenue | 8,506,008 | 7,313,120 |
| Earnings | 653,739 | 492,336 |

**WABASH**
Year Ended December 31

| | 1976 | 1975 |
|---|---|---|
| Shr Ernd | $1.81 | $.80 |
| Revenue | 53,052,945 | 33,016,179 |
| Disc Op | ..... | 31,993 |
| Earnings | 3,055,032 | 1,329,912 |
| 3 Mo Shr | .66 | .43 |
| Revenue | 22,316,958 | 9,542,108 |
| Disc Op | ..... | 31,993 |
| Eernings | 1,126,710 | 705,268 |

**WALLACE BUSINESS FORMS**
Three Months Ended April 31

| | e1977 | 1976 |
|---|---|---|
| Shr Ernd | $.65 | $.60 |
| Revenue | 20,717,000 | 17,712,000 |
| Earnings | 1,323,000 | 1,177,000 |
| 9 Mo Shr | 1.90 | 1.85 |
| Revenue | 60,719,000 | 55,283,000 |
| Earnings | 3,843,000 | 3,632,000 |

a-Includes results of Datamark, Inc., acquired in November 1976.

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TRADE*QUOTES

# Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, JULY 20, 1977

All statistics compiled,
computed and formatted by
TRADE★QUOTES, INC.
Cambridge, Mass. 02139

COMPUTER SYSTEMS

| EXCH | | PRICE 1977 RANGE (1) | CLOSE JUL 20 1977 | WEEK NET CHNGE | WEEK PCT CHNGE |
|---|---|---|---|---|---|
| O | AMDAHL CORP | 0- 39 | 32 1/4 | +2 | +6.6 |
| N | BURROUGHS CORP | 55- 91 | 68 5/8 | +6 1/8 | +9.7 |
| O | COMPUTER AUTOMATION | 18- 28 | 26 3/4 | + 1/4 | +0.9 |
| N | CONTROL DATA CORP | 20- 26 | 22 5/8 | +1 5/8 | +7.7 |
| N | DATA GENERAL CORP | 35- 50 | 49 1/2 | +4 3/4 | +10.6 |
| N | DATAPOINT CORP | 18- 30 | 27 3/8 | + 1/2 | +1.8 |
| N | DIGITAL EQUIPMENT | 37- 53 | 48 3/4 | +2 3/4 | +5.9 |
| N | ELECTRONIC ASSOC. | 2- 3 | 2 | 0 | 0.0 |
| A | ELECTRONIC ENGINEER. | 8- 10 | 8 3/4 | - 3/8 | -4.1 |
| O | FOUR-PHASE SYSTEMS | 13- 17 | 15 1/4 | 0 | 0.0 |
| N | FOXBORO | 42- 54 | 47 1/2 | + 1/8 | +0.2 |
| O | GENERAL AUTOMATION | 6- 9 | 7 3/8 | - 1/4 | -3.2 |
| O | GRI COMPUTER CORP | 1- 1 | 1/2 | - 1/8 | -20.0 |
| N | HEWLETT-PACKARD CO | 69- 87 | 82 1/4 | +2 | +2.4 |
| N | HONEYWELL INC | 44- 55 | 53 5/8 | - 3/4 | -1.3 |
| N | IBM | 245-286 | 273 | +11 7/8 | +4.5 |
| O | MANAGEMENT ASSIST | 5- 9 | 6 3/4 | + 3/8 | +5.8 |
| O | MEMOREX | 23- 29 | 28 | +2 1/8 | +8.2 |
| O | MICRODATA CORP | 7- 18 | 9 7/8 | 0 | 0.0 |
| O | MODULAR COMPUTER SYS | 5- 8 | 7 7/8 | + 1/8 | +1.6 |
| N | NCR | 32- 42 | 42 | +5 1/8 | +13.8 |
| O | PRIME COMPUTER INC | 12- 18 | 17 3/8 | + 1/8 | +0.7 |
| N | PERKIN-ELMER | 17- 22 | 21 1/8 | + 1/2 | +2.4 |
| N | RAYTHEON CO | 16- 33 | 31 1/2 | +1 5/8 | +5.4 |
| N | SPERRY RAND | 34- 42 | 37 1/2 | +2 1/4 | +6.3 |
| O | SYCOR INC | 8- 15 | 9 7/8 | - 5/8 | -5.9 |
| A | SYSTEMS ENG. LABS | 5- 8 | 8 1/8 | + 7/8 | +12.0 |
| N | VARIAN ASSOCIATES | 15- 21 | 19 1/8 | + 1/8 | +0.6 |
| A | WANG LABS. | 14- 20 | 19 7/8 | + 7/8 | +4.6 |

LEASING COMPANIES

| EXCH | | PRICE 1977 RANGE (1) | CLOSE JUL 20 1977 | WEEK NET CHNGE | WEEK PCT CHNGE |
|---|---|---|---|---|---|
| O | BOOTHE COURIER CORP | 8- 10 | 10 1/8 | + 1/2 | +5.1 |
| O | COMDISCO INC | 10- 13 | 10 1/4 | - 1/4 | -2.3 |
| A | COMMERCE GROUP CORP | 2- 2 | 2 | 0 | 0.0 |
| A | COMPUTER INVSTRS GRP | 1- 2 | 7/8 | - | -6.7 |
| M | DATRONIC RENTAL | 1- 2 | 1 1/8 | + 1/8 | +12.5 |
| A | OCL INC | 1- 2 | 2 | 0 | 0.0 |
| N | DPF INC | 6- 9 | 8 5/8 | + 5/8 | +7.8 |
| N | ITEL | 13- 20 | 19 5/8 | - 1/8 | -0.6 |
| N | LEASCO CORP | 19- 25 | 24 7/8 | + 1/8 | +0.5 |
| O | LEASPAC CORP | 1- 2 | 1 | - 1/2 | -33.3 |
| O | NRG INC | 0- 0 | 1/4 | + 1/8 | +100.0 |
| A | PIONEER TEX CORP | 5- 11 | 6 | + 1/4 | +4.3 |
| N | U.S. LEASING | 10- 15 | 14 3/4 | +1 | +7.2 |

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH
L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

SOFTWARE & EDP SERVICES

| EXCH | | PRICE 1977 RANGE (1) | CLOSE JUL 20 1977 | WEEK NET CHNGE | WEEK PCT CHNGE |
|---|---|---|---|---|---|
| O | ADVANCED COMP TECH | 1- 2 | 1 | 0 | 0.0 |
| O | ANACOMP INC | 7- 9 | 9 1/4 | + 3/8 | +4.2 |
| A | APPLIED DATA RES. | 5- 10 | 9 1/2 | + 5/8 | +7.0 |
| N | AUTOMATIC DATA PROC | 23- 30 | 29 | + 7/8 | +3.1 |
| O | COLEMAN AMERICAN COS | 2- 2 | 2 | + 1/4 | +14.2 |
| O | COMPU-SERV NETWORK | 10- 15 | 11 1/2 | - 1/2 | -4.1 |
| O | COMP ELECTION SYSTMS | 6- 9 | 9 1/4 | 0 | 0.0 |
| O | COMPUTER HORIZONS | 1- 1 | 1 1/4 | 0 | 0.0 |
| O | COMPUTER NETWORK | 6- 7 | 6 1/8 | - 1/4 | -3.9 |
| N | COMPUTER SCIENCES | 7- 9 | 8 3/8 | + 1/4 | +3.0 |
| O | COMPUTER TASK GROUP | 1- 2 | 1 1/4 | 0 | 0.0 |
| O | COMPUTER USAGE | 1- 3 | 1 1/2 | 0 | 0.0 |
| O | COMSHARE | 5- 7 | 6 1/2 | - 1/4 | -3.7 |
| O | DATA DIMENSIONS INC | 4- 5 | 3 1/2 | 0 | 0.0 |
| O | DATATAB | 1- 2 | 1 7/8 | 0 | 0.0 |
| N | ELECTRONIC DATA SYS. | 16- 20 | 18 7/8 | - 3/8 | -1.9 |
| O | INSYTE CORP | 2- 3 | 1 7/8 | 0 | 0.0 |
| O | IPS COMPUTER MARKET. | 1- 2 | 1 1/2 | 0 | 0.0 |
| O | KEANE ASSOCIATES | 3- 4 | 4 7/8 | +1 3/8 | +39.2 |
| O | KEYDATA CORP | 2- 3 | 1 3/4 | - 1/8 | -6.6 |
| A | LOGICON | 7- 17 | 13 7/8 | -2 1/8 | -13.2 |
| A | MANAGEMENT DATA | 1- 2 | 1 5/8 | + 1/8 | +8.3 |
| A | NATIONAL CSS INC | 19- 25 | 23 7/8 | + 1/2 | +2.1 |
| O | NATIONAL DATA CORP | 4- 7 | 6 1/8 | 0 | 0.0 |
| A | ON LINE SYSTEMS INC | 17- 22 | 19 1/4 | + 7/8 | +4.7 |
| N | PLANNING RESEARCH | 3- 5 | 5 | + 1/2 | +11.1 |
| O | PROGRAMMING & SYS | 1- 1 | 5/8 | + 1/8 | +25.0 |
| O | RARIDATA INC | 2- 3 | 2 3/4 | + 1/4 | +10.0 |
| O | REYNOLDS & REYNOLD | 17- 20 | 19 3/4 | + 1/4 | +1.2 |
| O | SCIENTIFIC COMPUTERS | 1- 3 | 3 1/8 | 0 | 0.0 |
| O | TYMSHARE INC | 14- 23 | 21 1/2 | + 1/4 | +1.1 |
| A | URS SYSTEMS | 4- 5 | 4 1/4 | - 1/4 | -5.5 |
| N | WYLY CORP | 1- 2 | 1 3/8 | + 1/8 | +10.0 |

PERIPHERALS & SUBSYSTEMS

| EXCH | | PRICE 1977 RANGE (1) | CLOSE JUL 20 1977 | WEEK NET CHNGE | WEEK PCT CHNGE |
|---|---|---|---|---|---|
| N | ADDRESSOGRAPH-MULT | 10- 15 | 14 1/4 | + 1/2 | +3.6 |
| O | ADVANCED MEMORY SYS | 7- 9 | 8 1/8 | - 1/4 | -2.9 |
| N | AMPEX CORP | 8- 11 | 11 | + 1/8 | +1.1 |
| O | ANDERSON JACOBSON | 3- 5 | 4 1/4 | - 1/4 | -5.5 |
| N | APPLIED DIG DATA SYS | 10- 16 | 14 7/8 | + 1/4 | +1.7 |
| O | BEEHIVE INT'L | 8- 12 | 9 5/8 | + 1/8 | +1.3 |
| A | BOLT,BERANEK & NEW | 7- 8 | 7 1/4 | + 5/8 | +9.4 |
| N | BUNKER-RAMO | 8- 12 | 10 3/4 | + 1/4 | +2.3 |
| A | CALCOMP | 3- 5 | 3 | 0 | 0.0 |
| O | CAMBRIDGE MEMORIES | 1- 3 | 2 3/4 | + | +2.2 |
| N | CENTRONICS DATA COMP | 22- 29 | 28 5/8 | +2 1/8 | +8.0 |
| O | COGNITRONICS | 1- 1 | 1/2 | 0 | 0.0 |
| O | COMPUTER COMMUN. | 5- 6 | 6 5/8 | + 1/4 | +3.9 |
| O | COMPUTER CONSOLES | 4- 7 | 4 3/4 | 0 | 0.0 |
| A | COMPUTER EQUIPMENT | 2- 3 | 3 | + 1/8 | +4.3 |
| O | COMPUTER TRANSCEIVER | 1- 1 | 1 | 0 | 0.0 |
| O | COMTEN | 9- 13 | 10 7/8 | - 1/2 | -4.3 |
| N | CONRAC CORP | 19- 28 | 22 3/8 | -1 3/8 | -5.7 |
| O | DATA ACCESS SYSTEMS | 4- 5 | 4 | 0 | 0.0 |
| O | DATA 100 | 6- 9 | 8 1/2 | + 3/4 | +9.6 |
| A | DATA PRODUCTS CORP | 9- 15 | 14 3/4 | + 3/8 | +2.6 |
| O | DATA TECHNOLOGY | 3- 4 | 4 | 0 | 0.0 |
| O | DATUM INC | 1- 2 | 1 3/4 | + 1/4 | +16.6 |
| O | DECISION DATA COMPUT | 2- 3 | 2 1/2 | - 1/8 | -4.7 |
| O | DELTA DATA SYSTEMS | 1- 1 | 3/8 | 0 | 0.0 |
| N | ELECTRONIC M & M | 4- 5 | 4 | - 1/8 | -3.0 |
| O | FABRI-TEK | 1- 2 | 1 1/4 | 0 | 0.0 |
| O | GENERAL COMPUTER SYS | 0- 2 | 1 1/4 | 0 | 0.0 |
| N | HAZELTINE CORP | 9- 12 | 10 1/8 | + 1/8 | +1.2 |
| N | HARRIS CORP | 28- 39 | 36 1/8 | - 3/4 | -2.0 |
| A | INCOTERM CORP | 11- 15 | 11 1/8 | + 1/4 | +2.2 |
| O | INFOREX INC | 4- 7 | 5 1/8 | - 1/4 | -4.6 |
| O | INFORMATION INTL INC | 9- 14 | 10 | - 1/4 | -2.4 |
| O | INTEL CORP | 38- 57 | 51 | +2 1/2 | +5.1 |
| A | LUNDY ELECTRONICS | 3- 6 | 5 5/8 | + 1/4 | +4.6 |
| O | MSI DATA CORP | 6- 10 | 9 1/2 | + 3/8 | +4.1 |
| N | MOHAWK DATA SCI | 5- 8 | 5 3/4 | + 7/8 | +17.9 |
| O | PENRIL CORP | 2- 5 | 4 1/2 | 0 | 0.0 |
| A | PERTEC CORP | 7- 9 | 8 3/8 | + 3/4 | +9.8 |
| A | POTTER INSTRUMENT | 2- 2 | 1 3/4 | 0 | 0.0 |
| O | PRECISION INST. | 2- 2 | 1 1/2 | 0 | 0.0 |
| O | QUANTOR CORP | 4- 5 | 4 | + 1/8 | +3.2 |
| O | RECOGNITION EQUIP | 6- 10 | 8 7/8 | - 1/8 | -1.3 |
| O | SCAN DATA | 1- 2 | 1 1/2 | 0 | 0.0 |
| O | STORAGE TECHNOLOGY | 10- 15 | 13 1/4 | - 1/8 | -0.9 |
| O | T BAR INC | 7- 12 | 12 | + 3/8 | +3.2 |
| O | TALLY CORP. | 4- 6 | 3 3/4 | - 1/4 | -6.2 |
| A | TEC INC | 7- 10 | 8 1/4 | - 1/8 | -1.4 |
| N | TEKTRONIX INC | 29- 37 | 36 1/2 | +2 3/8 | +6.9 |
| N | TELEX | 2- 3 | 3 | + 3/8 | +14.2 |
| O | WILTEK INC | 1- 1 | 1/2 | 0 | 0.0 |

SUPPLIES & ACCESSORIES

| EXCH | | PRICE 1977 RANGE (1) | CLOSE JUL 20 1977 | WEEK NET CHNGE | WEEK PCT CHNGE |
|---|---|---|---|---|---|
| O | BALTIMORE BUS FORMS | 2- 4 | 1 3/4 | 0 | 0.0 |
| A | BARRY WRIGHT | 10- 14 | 14 1/4 | + 1/2 | +3.6 |
| O | CYBERMATICS INC | 1- 1 | 5/8 | 0 | 0.0 |
| O | DUPLEX PRODUCTS INC | 14- 19 | 18 1/2 | +1 | +5.7 |
| N | ENNIS BUS. FORMS | 6- 7 | 6 3/8 | + 1/8 | +2.0 |
| O | GRAHAM MAGNETICS | 11- 15 | 14 1/4 | - 1/2 | -3.3 |
| O | GRAPHIC CONTROLS | 15- 18 | 17 | + 3/4 | +4.6 |
| N | 3M COMPANY | 48- 56 | 49 7/8 | +1 1/4 | +2.5 |
| O | MOORE CORP LTD | 27- 37 | 27 3/4 | + 3/4 | +2.7 |
| N | NASHUA CORP | 16- 25 | 24 | - 5/8 | -2.5 |
| O | STANDARD REGISTER | 18- 25 | 23 | 0 | 0.0 |
| O | TAB PRODUCTS CO | 13- 19 | 18 1/2 | +2 1/2 | +15.6 |
| N | UAPCO | 19- 22 | 21 3/4 | + 3/4 | +3.5 |
| A | WABASH MAGNETICS | 10- 15 | 13 7/8 | 0 | 0.0 |
| N | WALLACE BUS FORMS | 17- 21 | 19 1/2 | +1 | +5.4 |

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